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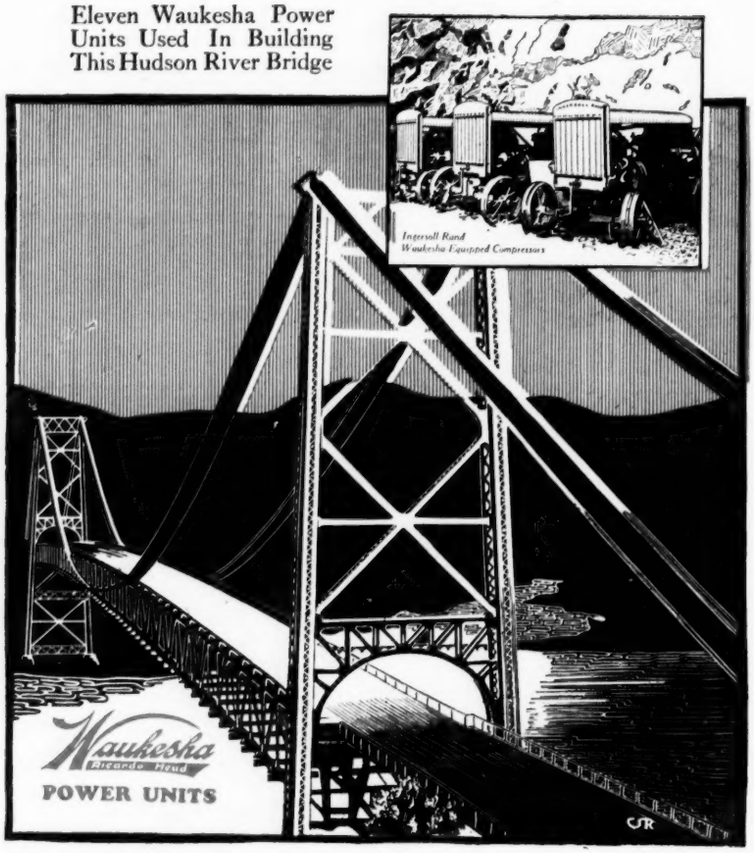

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AUTOMOTIVE INDUSTRIES
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Style and Comfort Vie for Dominance in Modern Body Design

Characteristics of flapper age are reflected in current body trends. Wider seats, increased headroom and a greater appeal to woman buyer predicted for future models.

THE modern flapper is largely responsible for present day body design. She expresses the spirit of the age and automobile body design always will reflect the characteristics of the period in which it is evolved. Snap and go, trim lines and flashy colors are going to be common features of bodies for the next few years both in production and custom built lines. This was one of the important ideas gathered from the fifth annual convention of the Automobile Body Builders' Association which met at the Hotel Statler, Detroit, June 2 and 3.

A general feeling seemed to exist among these body makers that artistic and colorful paint combinations will continue and grow in importance as factors in body design. Experimental work now under way in the laboratories of the lacquer and varnish manufacturers bids fair to make such combinations easier, cheaper and quicker to apply as time goes on, so that the body designer will not lack the materials with which to carry out in a commercial way his artistic ideals.

But style isn't going to dominate the design situation entirely. Some of the body men think it has been allowed too much leeway in recent years and that comfort hasn't been getting a fair share of attention. One manufacturer is quoted as having said recently that "In America style never yields to comfort." And there is little question that the flapper influence on present day design has resulted in sacrificing comfort on the altar of style in certain instances.

Seats have been narrowed materially in recent years, for example, to emphasize the stream line effect dictated by style. Some engineers, H. C. Wendt of Moon for one, believe that the pendulum is about to swing back again as regards seat widths; that people will be willing to sacrifice a little in eye appeal to get a corresponding gain in seating capacity. The lower limit seems to have been reached also as regards headroom. While there is no expectation that tops will be heightened greatly, more than one body designer is convinced that the tendency will be to add an inch or two headroom in the next few years rather than to reduce it further.

The ideal, of course, will be to combine the highest degree of comfort with the most attractive styles and that is the end

James A. Daugherty

RETIRING president of the Automobile Body Builders Association. Body building is a job best done by the specialist, Mr. Daugherty thinks, and in support of this fact he cited the cases of several prominent car builders who have recently closed their body plants and are now buying bodies from exclusive body manufacturers.

toward which the body designers will work. Already it is certain that custom-built styles will be incorporated in production jobs to a greater extent in the future than they have been in the past. That trend became evident at the New York show last January. Since that time many evidences of its continuance have appeared.

Several other points of importance were developed at the meeting, among which were the following:

1. Woman's influence on car buying has been materially increased by the great increase in closed car popularity.

2. Steel bodies have many advantages, but the die costs involved in their production make feasible their adoption only for quantity production work.

3. Fabric body development is continuing and several important manufacturers are experimenting with this type of body.

4. The smaller body builders have experienced relatively good business this year and are in better economic condition than for some time past.

5. Standardization work is progressing and the body builders can make good use of the facilities of the Society of Automotive Engineers in this connection.

6. The paint chemist may produce even more startling results in the next five years than he has in the past five.

Optimistic predictions for the future of the body building industry were made by J. A. Daugherty, president of the Association, in the address with which he opened the meeting. He pointed out that several important automobile manufacturers recently have discontinued part of their body manufacturing activities and have turned over a greater proportion of this work to body specialists.

H. C. Wendt

MR. WENDT is body engineer for the Moon Motor Car Co. He thinks that the pendulum in body design is swinging back to wider seats, and also that there will be no further decrease in the head room of closed models. They are low enough now, he says

This trend is a tribute to the efficiency of the body building industry. Mr. Daugherty deplored the practice, still common enough to cause trouble, of car manufacturers placing large orders for bodies and then sending through sudden cancellations. He urged that obligations, once contracted, be fulfilled.

If American manufacturers would equip open cars with tops which actually could be put down without difficulty they would sell a lot more vehicles of this type, particularly in foreign markets, Ottis Lucas, Lincoln division, Ford Motor Co., told the body builders in his talk on trends in body policies among builders of fine cars. The trouble with most tops today, he said, is that one can't put them down; consequently the car is not really an open car. Custom design is coming into common use on production jobs, Mr. Lucas pointed out. Consequently the custom builders now are getting orders in sufficient quantities to make worth while profits in many cases. Throughout the industry, custom built ideas are being put into production cars more and more every year.

The policy of bringing out yearly models was opposed very strongly by Mr. Lucas. Following the lead set in recent months by T. J. Litle, Jr., chief engineer of Lincoln, Mr. Lucas said that one advantage of the custom built job is that it can't be declared out of style overnight by the edict of some salesmanager.

The Feminine Influence

It was generally agreed among the body men that woman's needs and likes have not been given enough consideration by body designers in the past. H. C. Wendt urged, for example, that future bodies should be built to meet the requirements of women from the standpoint of strength, appearance, and convenience. He pointed out that many doors which easily can be opened by a man, can be opened by an average woman only with the greatest difficulty and that window lifts which cause a man no trouble whatever may be a source of considerable annoyance to a woman. In the same way seats which slant down sharply from front to back may be easy for most men to arise from, but they often present great difficulties for the woman inclined to stoutness.

Because of such facts, the body builder in the future should set up feminine rather than masculine standards as the basis of his construction and equipment. These are practical design matters which are of greater importance even than those matters of taste which usually have been the only ones considered in attempting to please the woman buyer.

Mr. Wendt's paper was on trends in body styles. He pointed out that body engineers have been trying for several years to see how low they can get headroom and that in many cases it would seem that the limit already has been reached. Only a few years ago 45 inches was considered reasonable for headroom, while today several makers have gone as low as 36 in., and some even lower. From the standpoint of style, it is desirable to have the headroom as low as is consistent with comfort.

Belt lines should be as high as possible. Wide doors, low windows and low roofs will be characteristic of progressive designs in the next few years.

Wider Seats Again

The pendulum is swinging back again to wider seats, after several years of popularity for the narrow seat. Because of chassis limitations it isn't possible to increase the actual width of the seat itself—as a matter of fact balloon tires have made this problem more difficult than ever. But greater shoulder room can and will be provided in cars before long.

Moldings will be an integral part of body design for some time to come. The use of two and three-color paint jobs has done much to improve body design recently and this type of job has been brought about partly because of the use of moldings.

Leather backs and landau joints are not going out. Instead they are becoming more popular than ever, Mr. Wendt thinks. It will be common practice to build the windshield integral with the roof from now on.

Mr. Wendt urged the full utilization of pyroxylin finishes, but urged that they be polished to the highest possible luster, at least for the next two years. By that time he believes the public will have become better sold

on the velvet finish and such high luster will not be necessary.

The 4-door sedan will be the most popular model in the closed car line, he stated, but will be followed closely by the 2-door coach.

He commented on the present popularity of the roadster, but said that he could not offer any reason for its recent return to public favor.

A reaction has set in from the tendency to cheapen bodies and body materials which started about two years ago, according to Mr. Wendt. There was a very general tendency two years ago, he said, to try to meet competitive conditions by cutting corners wherever possible and by cheapening the product in many particulars. The trend has reached its limit, he said, and from now on quality is going to play a more important part than ever in body design and manufacture.

Commenting on the all-steel body he voiced the opinion that the public is neither specially in favor of nor opposed to such bodies. He doesn't believe that the public is so much interested in the type of construction as in the appearance and durability. He pointed out that the chief hindrance to wider use of steel bodies is the very great die cost involved in their manufacture.

The fabric body, he feels, will be treated as an innovation unless it can make a specific price appeal.

If a body designer is seeking to do something out of the ordinary, he should design a body without any moldings whatever, Mr. Wendt said. Such a design can be made to look very well and would be different than the large majority of designs for the next few years.

Nitro-cellulose finishes and their various aspects occupied the center of the stage at one entire session. Particular interest attached to the comments of L. Clayton Hill of Valentine & Co., who stated that although lacquer finishes have arrived and are accepted generally, the field of possibilities is almost unlimited. While the time required for finishing has been strikingly reduced from that of the older varnish methods, only a beginning has been made.

Lacquer manufacturers have the ideal of producing a finish in one coat, which will dry in a half hour. This ideal can not be achieved in one stride, but developments made already indicate that a finish of this nature is not outside the realms of possibility.

Lacquer Development

Although Mr. Hill's set topic was "The Progress of Lacquer Finishes," he devoted the major portion of his talk to brief comments on what lacquer manufacturers are working toward. Coupled with these were several warnings which have been developed out of his contact with finishers of cars and buses. Among other things, he said, lacquer development is tending toward the following:

1. Development of a clear finishing lacquer which be sprayed or brushed on to produce a final coat which will have the luster of clear finishing varnish.
2. A lacquer which will have a bright luster without the necessity of rubbing with abrasive materials.
3. A brushing lacquer which will produce a finish in one coat.
4. Development of new solvents and thinners which will reduce the cost of lacquers and facilitate their application.
5. Improvements which will eliminate any chalking tendency.
6. Improvements in pigments which will eliminate any tendency toward fading. Since the introduction of lacquer great improvement has been made in this direction and now it is possible to produce several colors which formerly faded and gave trouble.

Mr. Hill warned against the mixing of the solvents of one manufacturer with the lacquer produced by another concern. More than one solvent goes into the preparation of any lacquer and the balance of these solvents is dependent upon the relative amounts of gum, plasticiser and pigment. The solvent for a given brand is balanced with the constituents of the lacquer. When mixed with another lacquer, only luck will bring about any balance and a good lacquer may be ruined by a good solvent of another brand.

L. Clayton Hill (left), automotive sales manager, Valentine & Co., who read an interesting paper on "Progress of Lacquer Work." Right—Frederick D. Mitchell, secretary and treasurer of the A. B. B. A.

All-nitro-cellulose finishes which allow the finishing of a body in 2½ hr., have been developed already and very good finishes can be produced in 4½ hrs., but the present desire for a good finish of high gloss is the greatest obstacle to more rapid production rates.

Great flexibility and a high degree of durability were advanced as the outstanding recommendations of long oil enamels for bus finishing by Chas M. Long of the Glidden Varnish Company. This finish is produced by the ageing and treatment of long oils. While the time required for finishing a job is somewhat greater than that of some other finishes, this factor is offset by the durability and smart appearance of the finished job. No set of long distance recommendations can be made for finishing any particular job.

The choice of the type of finish should be governed by conditions at the plant and the desired result in service. Long oil enamel can be applied in a rubbing routine or by the direct application of one coat above another with no intermediate rubbing.

High gloss enamels were discussed by E. G. Richard-

These men took an active part in the A. B. B. A. convention. Left to right—A. L. Knapp, Packard Motor Car Co.; Charles M. Long, Glidden Varnish Co., J. Alex Wilson, Beckwith-Chandler Co.; E. G. Richardson, Berry Bros., and Kenneth L. Childs, president Fabric Body Corp.

son of Berry Bros. He stated that three factors control the gloss of the finish. They are as follows:

1. The condition of the undercoat. A hard surface which is thoroughly oxidized is conducive to the highest luster of subsequent lacquer finish.
2. The character of the lacquer.
3. The character of the rubbing.

Oil undercoats were recommended by J. A. Wilson of the Beckwith Chandler Company, who stated that lacquer adheres and spreads better on this surface than on a base of related materials. The oil undercoat must be oxidized thoroughly and this process can be accelerated by heat and air circulation, although no scientific working standard for the term, complete oxidation has been developed. The less the amount of pigment in the undercoats the greater the adhesion. For the best conditions, two to four coats of undercoat should be used and should produce a hard non-porous surface.

George B. Spragg of the International Motor Co. (left) and E. J. Thompson, president of the E. J. Thompson Co. Mr. Spragg discussed the "Effect of Conflicting State Laws on Bus Construction," and Mr. Thompson read a paper on "Bus Nomenclature"

In the application of nitro-cellulose coats for the undercoat or finish the succeeding coat should not be applied until the solvent in the previous coat is evaporated thoroughly. Otherwise this solvent is trapped and will form a blister in the finished surface. It is anticipated that nitro-cellulose finishes will be developed in which the color will be built up in succeeding stages to a high luster in step with development of the surface of the finish.

The mechanical side of nitro-cellulose finish application was discussed by Mr. E. F. Frye of the DeVilbiss Manufacturing Company. Mr. Frye emphasized the need for air purifying equipment which will establish the humidity of the air stream and remove excess moisture and also remove all dust and oil. Main air lines and the piping at each spray booth should be equipped with air conditioning apparatus.

Air pressure should be maintained at the lowest point which will insure complete atomization of the lacquer application. Variations from 45 to 120 lb. per sq. in., are to be found in present practice. While some change is required for different finishes, this range is excessive and indicated that some finishers are not getting the best results out of the lacquer finish. Spray painting is a job which requires skill contrary to the general impression. The gun must be held at a uniform distance from the body or light and heavy patches will be produced. Depending upon other conditions, a distance of 6 to 10 in. between the gun and the surface of the body is recommended.

A sure way to produce a poor finish is to use high air pressure and a great distance from the gun to the body. Pressure feed is recommended on the lacquer supply and the amount discharged should be controlled at the beginning and end of each stroke of the gun across the body's surface.

W. K. Towers, advertising manager, Paige-Detroit Motor Co., speaking in the absence of Harry M. Jewett, emphasized the importance of body design in present day merchandising and pointed to increased closed body sales as the outstanding development of recent years.

It was Francis D. Willoughby, president, Willoughby Co., who brought out most strongly the idea that the flapper has been a strong influence on body design.

Body design, he said, usually reflects the characteristics of the age. Flapper psychology has had its effect on present day body design with the result that comfort has been sacrificed to style in some instances. It must be remembered, however, that chassis length is a very important factor in controlling comfort, and the trend today is toward shorter wheelbases.

Thinks Utility Comes First

Certain fundamentals always remain the same. Sitting characteristics don't change through the ages, nor are they affected by changing styles. While comfort

may yield to style to some extent, Mr. Willoughby believes that in the long run real utility—the combination of style and comfort—will win out. Also he confirmed Mr. Wendt's opinion that the limits almost have been reached as regards low headroom.

Development work in fabric bodies has been constant during the last few years, according to Kenneth Childs, president Fabric Body Corp. Only minor changes have been made in the method of construction, but wider use of such bodies has provided additional evidences of their practicability. Recently fabric finishes were applied to a group of wood-framed bodies taken directly from the production line of an important car manufacturer. Careful checking of costs after the work was finished showed a saving of 15 per cent over the composition bodies regularly used by this car maker. In other cases a saving of more than 20 per cent has been recorded. One important Italian manufacturer has ordered 500 fabric bodies from Fabric Body Corp., for use in his next year's production.

A. L. Knapp, body engineer, Packard Motor Car Co., said that the best field for the all-steel body is in the quantity production of a simple design. Such a body has many advantages, he stated, and one of its chief disadvantages—lack of flexibility—can be overcome by proper mounting on the chassis.

Reduction in Weight

Research and experimental activities have resulted in material reduction in weight of bus bodies during the last three years, according to E. J. Thompson, president, E. J. Thompson Co., who outlined recent developments in bus body building. Bus body design can be facilitated very greatly, he said, if the chassis engineer will cooperate to the fullest extent. Where the chassis design involves an ordinary passenger car hood on the body, for example, the problem of the body designer is made more difficult.

The body builders will do well to follow the standard nomenclature for bus bodies set up by the standards committee of the Society of Automotive Engineers, Mr. Thompson said. Then he went on to outline briefly that nomenclature.

Service problems should be given careful attention in designing bus bodies, he said, pointing out as an example of what can be done along this line the detachable panels that his organization has developed. These panels can readily be taken out and replaced.

Mr. Thompson is enthusiastic about the possibilities of the fabric body for bus work. Jobs which he has built average 300 to 400 lb. lighter than would aluminum bodies of the same design.

George J. Mercer, secretary-treasurer, Model Body Corporation, urged body builders to use more fully the standardization facilities of the Society of Automotive Engineers and outlined briefly the work that has been done by the body division of the S. A. E. Standards Committee. Work in connection with black enamel, which is now under way, he said, is the beginning of standardization activities on lacquers and varnishes.

Variations in Legislation

Varations in State legislation and their interference with the manufacturers' program were discussed by George B. Spragg of the International Motor Co. While such interference hampers the manufacturer, he said, this is but one aspect of the situation. The more tangible effect is reflected in the profits of bus operators. Some of the State legislation follows constructive lines and casual opinion from a local viewpoint will justify most of it.

In Next Week's Issue

P. M. HELDT, Engineering Editor of Automotive Industries, will be one of the speakers at the Summer Meeting of the S.A.E. at White Sulphur Springs, W. Va., June 16-19. His paper, dealing with "Some Recent Work on Unconventional Transmissions," will be condensed and published in two sections, the first section appearing in next week's issue and the second in the Engineering Issue of June 25, which will be devoted almost exclusively to the S.A.E. meeting.

Another interesting article on transmissions for the June 18 number comes from France, where final tests with the Lavaud automatic transmission, which entirely eliminates manual gear shifting except in starting, have just been completed. This article tells what the tests showed.

There will also be a description of changes recently made in the Cunningham passenger car chassis, in addition to the usual number of other special articles and an 11-page current news section.

However, the variation in regulations pertaining to bus construction and operation deter the manufacturer from standardized production and drive the body business particularly into small local shops which have not as yet produced satisfactory bodies for the long haul.

In most States the legal width of a bus body is 90 in., but two Southern States insist on a somewhat smaller figure. One State even lays down engineering specifications for the sizes of chassis components and these bear the legislative rather than an engineering stamp. Mr. Spragg's observations were confirmed by C. C. Todd, whose talk followed similar lines.

Speaking at the dinner which closed the meeting, George M. Williams, president, Nordyke & Marmon, stated that automobile manufacturers are realizing more than ever at this particular time that the style and design of bodies play an extremely important part in the ultimate volume of car sales. He estimated that between 75 and 80 per cent of sales today are influenced materially by the quality of interior finish and the external appearance of the car.

It is Mr. Williams' belief that the buying public has come to take more or less for granted the mechanical excellence of the automobile and that most people today are only incidently interested in the details of chassis change.

WE understand that there is a growing tendency to use automatic winding mechanism wherever clockwork is used in the industry. All recording instruments, including recording pyrometers, thermometers, resistance thermometers, pressure gages, tachometers and CO_2 meters, embody such clockwork. Where alternating current is available, these instruments are supplied with a synchronous motor clock, while where the current supply is direct the instruments are usually operated off an impulse time clock system.

To Succeed—
Deal Sincerely with Men, Watch Factory Overhead—

Three simple basic rules in his business creed:

- ¶ *Understand human nature and handle men sincerely;*
- ¶ *Work with dealers as though they were partners in the business;*
- ¶ *Keep factory overhead costs down to a minimum.*

Anybody can apply these rules, he says; the only trouble is that everybody doesn't.

By Norman G. Shidle

THE stock of his company had just reached a new high mark on the New York Exchange. His factories in the previous month had set a new production record. His dealers, their floors clear of cars, were wiring the factory for rush shipments. His quarterly statement, issued a week or two before, had shown a continued acceleration of the upward trend in profits. And he had just completed the organization of another company and was starting production of a new car.

It was this combination of facts which took me to Kenosha to see Charles W. Nash; to find out more about his history and about the business methods which he has used.

Born on Jan. 28, 1864, in the State of Illinois, he was bound out to a farmer at the age of seven. When he was twelve he broke away from the farmer and got a job with a carpenter.

He worked there for three months, receiving for his work $7 the first month, $8 the second month and $9 the third. Then harvest time came. He hired out to a farmer for a month at $12. That brought his total earnings for four months to $36. Out of that he saved $25 with which he bought himself ten sheep.

That was his start as an entre-preneur. Today he is president of the Nash Motors Co. at Kenosha, Wis., and the newly organized Ajax Motor Co. of Racine, Wis.

Mr. Nash's association in later years with J. Dallas Dort is familiar to the industry, but it is not so commonly known that he first came in contact with Mr. Dort as a member of a crew of cherry pickers on Mr. Dort's farm. This led to a job in the Dort carriage factory.

His progress in manufacturing was steady from that time on. After working for several years, first as an unskilled worker and later as a skilled mechanic, he became a shop foreman. His next step was to become superin-

Chas. W. Nash

President Nash Motors Co. and the more recently organized Ajax Motors Co. Bird's-eye view below shows Nash plant at Kenosha, Wis. The Ajax plant is at Racine

Says CHAS. W. NASH

tendent of the carriage factory. Finally he became general manager of the organization.

Nineteen years after joining the Durant-Dort Carriage Co. he resigned to become president of the Buick Motor Car Co. in Flint. That was in 1910. He directed the Buick organization until 1913. Its production increased steadily under Mr. Nash's management, reaching a total of about 28,000 in 1913.

In that year Mr. Nash became president of the General Motors Corporation, comprising Cadillac, Buick, Oldsmobile and Oakland car companies, the Northway Motor Mfg. Co., Weston-Mott Co. and the General Motors Truck Co. He remained in this position until 1916, when he severed his connection with the big combination to establish his own organization.

With several associates he purchased the properties of the Thomas B. Jeffery Co. of Kenosha. In 1917 the Nash company exhibited the Jeffery cars at the shows, but in the fall of that year the Nash line was announced. Since that time Mr. Nash has been engaged in building up that organization to its present stable position in the automotive industry.

Truly a full life—full of experiences, contacts with men of all classes and creeds, with ideals of unending variety, with the whole gamut of desires and motives which go to make up life and mankind. Little wonder then that, having reached the top, he has been able to understand and gain the sincere cooperation of the many men associated with him.

Despite a strenuous industrial life and the accumulation of wealth which has brought with it the opportunities for luxuries as well as comforts, Mr. Nash never has lost his taste for the great outdoors and the simple life. While he frequently plays golf, as do hundreds of his automotive colleagues, his greatest thrills come when so far out in the rough that the call of "Fore!" can be heard only through a radio set.

Fore!

Mr. Nash is an enthusiastic golfer. But he gets his greatest thrills tramping through the north woods in search of big game, or in fishing

Once a year he journeys to the northern woods of Michigan or Wisconsin in search of big game and good fishing. Usually he finds both. Both deer and moose have fallen before his gun.

How closely does a description of Charles W. Nash recall the great American who left to his country the heritage of a practically applied "square deal!" In ideals, in spirit, in love of the outdoors, in courage, in operating methods and in the profoundness of his simplicity, a strong parallel may be drawn between this head of a great automobile company and the rough-rider President of the United States whose portrait occupies a prominent place in the reception room of the Nash plant.

For Charles W. Nash is a fighter. Nobody can talk to him for five minutes without feeling the force of a strong personality behind a kindly and genial manner. He has fought his way to industrial success. Nobody left him a financial heritage. His life story reads almost like one of the Horatio Alger tales of our boyhood.

These ideas were a part of my reflections as the train hummed along the North Shore electric line. On both sides spread miles and miles of flat farm land. Suddenly Kenosha rose on the skyline like some modern dragon spurting smoke from its many nostrils.

Ten minutes later I was in the lobby of the Nash plant. A number of others were there before me. A genial man of some 215 lb. and 50 years presided over the reception desk. He knew many of the visitors and they seemed glad to know him. The

room is simply furnished, but my first impression was that I had entered some sort of a small town social club. I seemed to be welcome, but nobody bothered much with anybody else so far as ostentatious greetings were concerned. I felt comfortable.

"I have an appointment with Mr. Nash."

The big man took my card and turned to the telephone. No look of shocked surprise that somebody had walked in

Cooking Up a New One

Not a new car, as can easily be perceived, but a fish dinner. For Mr. Nash knows how to cook them as well as catch them. This picture was taken during a recent fishing trip to California.

casually and asked to see the president. No glance that said, "Well, the very idea! I doubt if you can see him, but I'll take your word for it and find out." Such glances are not unknown. Apparently people walked in and asked to see Mr. Nash every day.

The reception man turned from the telephone. "Go upstairs and turn to your left. It's the last office." I did. A brief greeting by Mr. Nash's secretary and thence to Mr. Nash's office.

By this time I knew that I was going to see a man—I was not being ushered into a presence.

A casual glance about the private office, as I acknowledged Mr. Nash's greeting.

An oak desk, a rugless floor, well lighted by windows on two sides and the walls dotted with pictures—pictures of friends, business and personal, of hunting and fishing trips, of places and people with whom personal memories probably are connected—human pictures.

And before Mr. Nash had lighted a fresh cigar, leaned back in his chair and wrinkled his eyes with that kindly suspicion of a smile which is one of his characteristic expressions, I was rather expecting the first thing he said in answer to my question: "What policies are responsible for building success in automobile manufacturing?"

"Humanity," he said—and paused. "It all gets back to men in the end and often to one man in an organization. The spirit of the man at the top of an outfit is almost certain to be reflected throughout the rank and file. Results are obtained not so much by the policies he enunciates as by the policies which he lives and acts."

And as Mr. Nash went on to expand his idea that manufacturing success is based on the human element in business, I was impressed with the fact that he never once mentioned welfare work, brass bands, baseball teams, hospitals, pig roasts and all the other things which usually are associated with the phrase "human relations in industry." The Nash factory has a baseball team and it has a brass band; so far as I know it may have pig roasts and annual picnics. But these things are not fundamental—they are the icing of the cake. Their usefulness depends on a proper ordering of other more practical and fundamental factors. Mr. Nash didn't say that, but his outline of policies indicated that his estimate of relative values is along those lines.

"The dealer is the basis of success in automobile manufacturing today," Mr. Nash went on. "It's possible for a good many people to get together sufficient money to buy a plant and equip it with tools. A good engineer can be hired to design a thoroughly good car. But nobody can build up a competent and adequate dealer organization overnight. A dealer organization of that kind is the result of years of consistent effort, unchanging factory policies and stable merchandising methods.

"When a factory is constantly changing its sales policies, even an able dealer can't make good. Consistency in factory policy is essential to sound dealer relationships.

"It's obvious that the factory must have prosperous dealers if it is to go forward. It can't have prosperous dealers unless it treats retailers as one sincere friend would treat another. Specifically, there are three things that must be a part of a successful handling of dealers:

1. Dealers must not be overloaded with cars under any circumstances. Overloading simply means a back up on the factory in the long run. It means lessened factory profits. From a purely selfish standpoint the manufacturer has nothing to gain and much to lose from overloading dealers.

2. Dealers should be protected on price reductions. The Nash company always has rebated dealers for losses sustained on cars in stock when a price reduction has taken place. The dealer is a partner in the business and should be treated as such.

3. The dealer is entitled to a product which is standardized sufficiently from year to year so that he is not overburdened with stocks of parts necessary to handle service adequately on old as well as new models. Many of the parts on both of the Nash six-cylinder models are interchangeable with those of the old four-cylinder line which has been discontinued. This phase design is considered as a part of our marketing policy.

"A lot of manufacturers may say that dealer policies of this kind are all right in theory but that conditions at the factory sometimes make it impossible to carry them out.

"That's right. But—such conditions shouldn't be allowed to arise at the factory.

"If the factory isn't operated properly and if the head of an organization can't see far enough ahead what is going to happen to the business situation, all the ideals in the world won't save him. As I said before, much of the success or grief which comes to an organization must be laid at the door of the man at its head. It's up to him to sit on the lid when enthusiasm in the factory sales force runs too high and to stimulate action when morale is low.

"Take the 1921 slump; it started in the last few months of 1920. The falling off in business at that time seemed to me to be inevitable. So I planned to meet it. On the first of January, 1921, we began a retrenchment policy in the Nash Motor Car Co. The storm which broke in full force a few months later found us better equipped to meet it than were a majority of automotive concerns.

"Business today is at its peak. We are now in process of setting new production records. But I am watching the situation very carefully. I don't see any clouds on the horizon now. But as soon as one appears, I'll begin to cut production.

"The big trouble is that a good many automobile executives won't admit that their particular company is bound to be affected by economic trends just like any other. Good methods and intensive selling may keep one plant in big production for a short time longer than anybody else, but in the end every company must bow to the general trend. Most automotive troubles in the past have come from the fact that nearly every company thinks that by some black magic or other it can make itself a complete exception to the general rule. This particular obsession usually is strongest when production is at its peak. As a result everybody keeps on going a few weeks too long.

"One of the chief rules for success in automotive manufacturing is this one: **'Look facts in the face—and then ACT accordingly.** Looking without acting is futile.'

"But whether times are good or bad, factory overhead should be kept to a minimum. Of course that's what every company aims to do, but, like individuals, companies often are prone to let unnecessary expenses run on until forced by necessity to cut them. The waste in the average American plant really is very great, despite all of our boasted efficiency.

"Overhead can run into very high figures if it isn't watched very carefully—and very often a large proportion of it consists of an accumulation of small wastes that easily may go unnoticed. Take such a thing as the electric light bill of a factory. I remember one plant of which I had charge where I cut the electric light bill in half one month as compared with the preceding month (which had been a normal one) simply by urging every man in the plant to keep lights turned off except when they actually were needed.

"Hundreds of similar items go to make up the overhead charges in any plant. We have kept them very low in the Nash plant, perhaps because that happens to be one of my particular personal hobbies. I hate waste. And I keep emphasizing the idea of 'cut the overhead' on every occasion. There isn't any other single thing more important in making a success in the automobile manufacturing business.

"But keeping down the overhead really gets back to the human element in the end. As in the electric light example I've cited, an idea had to be sold to a lot of individual human beings and their cooperation had to be obtained.

"It seems to me that the best way to get that very necessary human cooperation is simply to treat men in an honest and sincere way. I've never promulgated any high-flown theories about industrial relations. I like the men that work for me; I hope they like me. Naturally I'm friendly with them and I try my best to treat them squarely in every way. That's all.

"Success in automobile manufacturing rests basically, of course, on the profits obtained for the stockholders of the company," Mr. Nash continued. "But profits can be made consistently only by planning, operating and thinking on a long swing basis.

"When business conditions necessitate laying off men the Nash company lays them off just like every other industrial organization. But I try to do it in such a way as to cause the least distress possible and, wherever it can be done, I try to warn the men in advance.

"That's about all the answer I can give to your question. There isn't much to it. What I've said is a bit old-fashioned in many ways, but it's true.

"Understanding human nature and handling men sincerely; working with dealers as though they were partners in the business; keeping down overhead costs to a minimum—those are the three best rules for success in the automobile business that I know about. Anybody can apply them—the only trouble is that everybody doesn't."

* * * * *

The electric train was hurrying me back to Chicago. Mr. Nash, his organization, his factory and his production operations were running through my mind in rapid panorama. And I thought: "Doing big-time stuff but keeping the pleasant informality of the small-time atmosphere. That in itself is an achievement worth recording."

The Life of Chas. W. Nash in Brief

BORN in Illinois, January 28, 1864.

Bound out as farm hand at age of seven.

Ran away and became carpenter's helper at age of twelve.

Met J. Dallas Dort while working as cherry picker on latter's farm.

Accepted job in Mr. Dort's carriage factory, advancing in few years from common laborer to general manager.

Left Dort organization to become president of Buick Motor Car Co., 1910.

Became president of General Motors Corporation in 1913.

Resigned from General Motors in 1916; acquired interest in the old Thomas B. Jeffery Co. of Kenosha, and went into business for himself.

Introduced first Nash car in Autumn of 1917 after organizing and becoming president of Nash Motors Co.

1925, organized and was elected president of Ajax Motors Co. of Racine, Wis., in addition to retaining the presidency of Nash Co.

Just Among Ourselves

Sales Promotion Need a "Kick"

A FACTORY sales promotion manager was telling us some of his troubles the other day. His greatest difficulty, he says, is to get the distributers and dealers really interested in the material which he sends them; to get them to react to it either favorably or unfavorably. He sometimes becomes appalled at the amount of inertia that has to be overcome. We listened with a sympathetic ear because, after all, the job of a sales promotion man is very much like that of an editor. He seeks to impart information in such a way as to stimulate action. The problems are much the same in many cases. One important thing is that the job shall not be taken too seriously. Distributors and dealers are just ordinary human beings and a definite effort has to be made to appeal to them in a human way if their attention is to be gained. In preparing sales promotion material the factory man should assume that nobody is going to read it unless he makes it so attractive that it interests as well as instructs. "Ought to" means nothing in sales promotion work. If everybody read and did the things they ought to do sales promotion managers and editors wouldn't have any jobs.

Ideas from the Firing Line Help

THE factory sales promotion man usually is under the suspicion also of being theoretical— a term which, unfortunately, most people consider to be synonymous with impractical. Very often he can make his point better by seeking out a distributer who agrees with the method and practice and putting the sermon into that distributer's mouth. Most of us have more respect for the opinion of a man who is fighting in the same trench than for that of the head of the general staff three thousand miles from the firing line. The fact that the opinions may be identical doesn't matter much. The first carries more weight with the average man. For his own guidance, of course, the sales promotion man should lay out the fundamentals clearly and logically; that should be the basis of his work. But the presentation needs to have those qualities which make for successful magazine publication if it is to register in the field.

Extra! Patent Speech Opener Is Invented

WE'VE just thought of a great idea, but being unselfish as usual we will spring it for everybody's benefit before we get it patented and start to collect royalties. The idea consists of a patent opener for papers and speeches to be read before automotive societies. A long experience in opening and seeing opened such contrivances makes us particularly fitted to say that this patent opener will fit any and every speech or paper which may be delivered before any automotive organization. Its merits are many, but its chief advantages include the following: it relieves the speaker of the necessity for writing anything except what he really has to say; it saves the speaker's breath; but above all things it is guaranteed to keep an audience awake until the speaker gets to the point of what he has to say. Well, here it is. The speaker can just get up and say —"from the sun kissed shores of California to the rock bound coasts of Maine and all the rest of the bunk that usually takes up the first fifteen minutes of my talk brings me to the point of what I have to say . . ." Then he says it. Simple, isn't it. Yet the first three convention attenders to whom we propounded the idea immediately wanted to erect a monument in our office to mark the spot where the great idea was conceived. Being afraid the plan might be to have us personally form a foundation for the monument we appeared cold to the idea and have reason to hope that it has been abandoned. In case you can't use the idea right away, file it in your Labor Saving Devices file and throw it out with the rest of the trash when you clean out your desk after having been promoted the next time.

"Give a Long Yell for J-a-r-d-i-n-e"

HURRAY for the Secretary of Agriculture! We got a real thrill when we heard what he had to say about trucks and roads at the N.A.C.C. motor transport congress in Chicago. Here's what W. M. Jardine said: "There is one popular idea I feel disposed to deny. That is the idea that trucks are destroying our roads. I don't know why it should need denial, but apparently it does. Look around you. Are the roads getting better or worse? Have we ever before had such fine ones or so many of them? Have we ever before had fewer of them in a state of disrepair? Well, there are as many motor trucks using these roads today as there were all kinds of motor vehicles ten years ago, but the cost of roads per ton-mile of traffic is far less now than it was then." How's that for a straight, hard-hitting statement of the case?

—N. G. S.

Advantages and Difficulties of Single Plate Clutches Outlined

Types of clutch facing compared on bases of resistance to wear and smooth engagement. In heavy duty service cooling problem presents chief difficulty. Means for dissipating heat and preventing chatter.

At the May meeting of the S. A. E. Detroit Section, C. E. Wemp, chief engineer of the Long Mfg. Co., read a paper on "Developments in Automotive Clutches," in which the history of this important automobile component was traced and recent improvements in materials and methods of construction discussed in detail. The following is an abstract of Mr. Wemp's paper.

On the earlier automobiles the cone clutch was used most extensively, but a few years after the advent of the motor car the multiple disk-in-oil type made its appearance and competed with the cone type for popularity. About 1910 the dry disk type was introduced, and finally, in 1915, the single plate type arrived upon the scene. No new clutch types have been evolved during the past decade, but the clutch art has been markedly advanced during this period by refinement of design and by the development of its materials of construction. Mr. Wemp classified these developments under the following heads:

1. Improvements in methods of engagement.
2. Thermal efficiency.
3. Development of non-adjustable clutches.
4. Push type control in single plate clutches.
5. Improvements in release sleeve designs.
6. Balancing and its effect upon design.
7. Friction facings and their characteristics.

Meaning of "Thermal Efficiency"

The term "thermal efficiency" may be somewhat confusing, especially to those familiar with its use in connection with heat engines, but what is meant is the ability of the clutch to get rid of the heat generated whenever slipping occurs without the heat-sensitive facings rising to excessive temperatures.

Since the friction facing is one of the most important parts of the clutch, and since other improvements depend upon it, the author discussed this subject first. The development of asbestos base friction facing made possible the multiple dry disk and also the single plate type of clutch, and the author said the automotive industry owed a debt of gratitude to those who developed this type of facing.

The friction facing should permit smooth, flexible engagement over a wide range of speeds and be able to withstand hard, continuous service over a long period of time. These two characteristics do not always go together. In order that the facing may allow of smooth engagement it must possess a certain degree of compressibility and the limit of parallelism must be very close. Compressibility depends upon the method of manufacture and is inversely proportional to the density of the facing. Parallelism depends entirely on the care exercised in the manufacturing process and is independent of the type of facing.

The qualities which enable a friction facing to withstand hard service are as follows: (1) Density of structure, together with a reasonably high tensile strength; (2) A high friction coefficient which remains reasonably constant throughout a wide temperature range; (3) Ability to withstand high temperatures without deterioration and without bleeding out of the impregnating compound; (4) Complete penetration of the impregnating solution so that the resistance to wear remains constant as the facing wears down.

Two Classes of Friction Facings

There are two general classes of friction facings—molded and woven. The term "molded" as applied to this material is really a misnomer, as the facings are actually cut from a rolled sheet of asbestos. This sheet consists almost wholly of short fiber asbestos, with just enough starch added to it to make the sheeting process possible. After the sheets are dry they are rolled down to approximately the gage of the finished facing, a small amount of stock being allowed for grinding.

Facing rings are cut from the sheet by means of dies in a punch press. The rings are next treated with the impregnating solution and placed in a furnace for curing, which process requires several hours. After they have been allowed to cool and straightened, they are ground to size inside and out, and the surfaces are rough ground. The next operation consists in drilling and countersinking the rivet holes, after which the faces are finish ground.

The resulting facing is very dense, due to the rolling of the sheet, and has a fairly good tensile strength. This meets the requirements of wear, but not those of smooth engagement. The same quality of density makes it possible to grind the rings to close limits of parallelism.

The friction coefficient of molded facings varies with the impregating solution used, and the effect of temperature on the coefficient is also dependent on the same factor. However, facings of this type may be found which meet both requirements in connection with the friction coefficient.

Molded Facing Best for Heat

The ability to withstand high temperatures is one of the chief advantages of molded facing, and is due to the fact that the material consists of practically pure asbestos, with no foreign substances to char or burn out. One thing to look for in the selection of facing is the degree of permeation of the impregnating solution. The use of short fiber asbestos in the manufacture of molded facing, together with the fact that these facings are fabricated by press operations, permits them to be sold at a very reasonable price.

It will be seen from the above that molded facing, when properly made, answers the requirements of hard continuous service, but its density does not permit of easy

engagement unless an element of flexibility is introduced in the design of the clutch.

Woven facing, as the name implies, is the product of a loom. Long fiber asbestos, mixed with a small proportion of cotton, is twisted around a brass or copper wire to form a thread. The thread is woven into a straight band of the proper width but of greater thickness than the finished product. The band is next cut to length, bent edgewise around a mandrel whose diameter corresponds to the diameter of the facing, and stapled. The subsequent operations of impregnation, curing, drilling and grinding are substantially the same as with the molded type of facing. In order to increase the density of the facing, it is either subjected to an hydraulic compression operation or passed between rolls under high pressure.

Cotton a Limiting Factor

An analysis of a representative facing of this type shows it to consist of 50 per cent by weight of pure asbestos fiber, 25 per cent of wire, 10 per cent of cotton and 15 per cent of impregnating compound. Because of the cotton content in the woven facing it is necessary to keep the curing temperature below the charring point of cotton.

In comparing the qualities of the woven material with the specifications for the ideal facing, we find that it is inherently compressible and that it may be ground to reasonably close limits of parallelism. The compressibility, however, is a disadvantage from a service point of view, inasmuch as it necessitates the provision of means for adjustment in the design of the clutch. Adjustment is called for particularly when the facings are first put into service.

The friction coefficient of woven facing is ordinarily quite satisfactory, although it drops to a certain extent when the facing has worn down so that the wire interweave has become exposed. The weakest feature of woven facing is its inability to withstand high temperatures, the charring temperature of cotton being decidedly below the limiting temperatures attained in clutch operation under severe conditions, which results in the burning out of the cotton.

Owing to the fact that long fiber asbestos stock is used and that a considerable amount of brass and copper wire is required for interweaving, the price of woven facing runs from 20 to 25 per cent above that of the molded type.

From the above analysis it will be seen that the two types of facing are about equal as regards friction coefficient and permeation. The woven type has the advantage from the standpoint of smooth engagement, while the molded type has a decided advantage in its higher heat resisting ability and its lower cost.

One of the most interesting developments in clutch design of recent years has had for its object to make it possible to use the dense molded type of facing and still obtain smooth engagement. This problem presented itself particularly in connection with the single plate type of clutch,

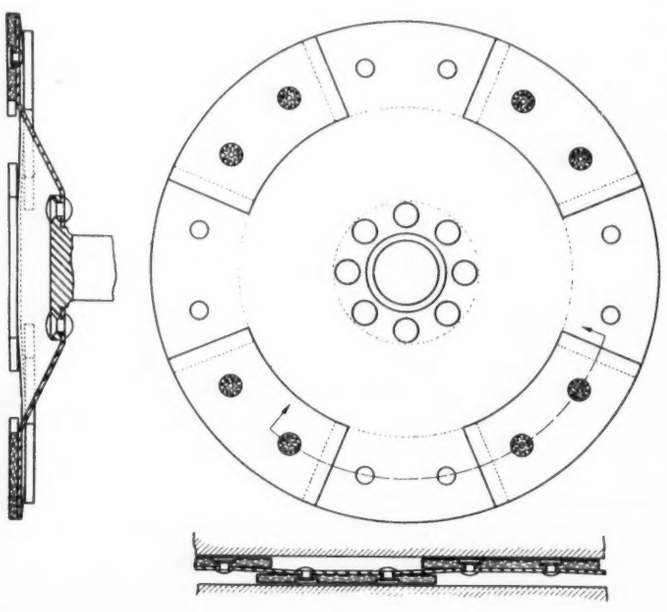


Fig. 1—Durant single plate clutch

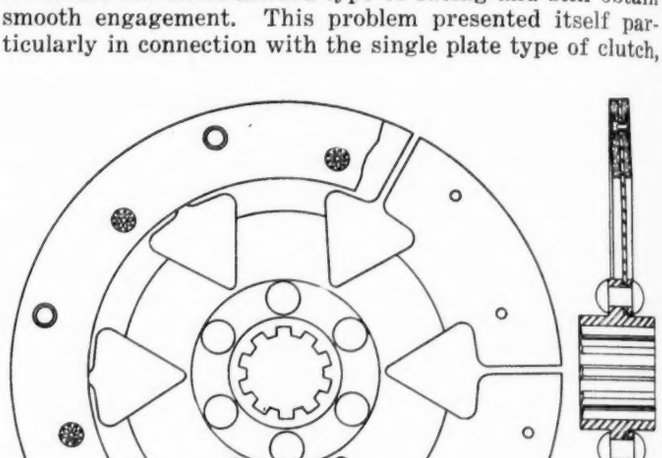


Fig. 2—Long single plate clutch

which it is very difficult to get to engage smoothly, without chatter. This can be accomplished only by providing a certain amount of flexibility in the driven member. Parallelism of the driven member and facings reduces the need for flexibility but does not obviate it entirely.

The flexibility needed can be obtained either by the use of a rigid, plane driven disk and woven friction facings or by the use of molded type facings together with a driven disk of flexible design. The latter method is at present being used by at least three concerns. Where woven facings are used the yieldability of the facing itself meets the requirements quite well when new, but, unfortunately, it decreases as the facing wears down. The engaging action of clutches with this type facing is therefore comparatively smooth initially but gradually becomes poorer.

Disk of Durant Clutch

In the driven disk of the Durant clutch (Fig. 1) the outer rim section is given a wave form and segmental sections of molded friction facing are riveted to the crest of each wave on both sides of the disk. This arrangement staggers the segmental facings on opposite sides of the disk. When the clutch is engaged there will be a tendency for the waves to flatten out, and the pressure of engagement therefore will increase gradually.

A similar method is used in the Long clutch (Fig. 2). A spoked sheet metal disk of high carbon spring steel is used, the spokes having enlarged facing-carrying areas at their outer ends. The central portion of the disk is made flat but the rim section is formed into a 3 deg. cone. The disk in this form is heat treated to a spring temper, which permits the spokes to be bent considerably without taking

a permanent set. The facings, which are previously ground parallel, are riveted to the rim section of the disk in the usual manner, thus conforming to the conical portion of the disk.

When the clutch is engaged the inner portion of the forward facing engages the flywheel first, while the outer section of the rear facing engages the pressure plate. As the engaging pressure increases, the spokes of the disk are deformed, thus providing the yieldability necessary to smooth engagement.

Both of the methods described are used with single plate designs. A similar construction is used in a multiple dry disk clutch by the Fuller Company of Kalamazoo, Mich. In the Fuller design molded friction facings are riveted to flat driving disks. The annual driven disks of high carbon steel are given a wave form, so that the crests of the wave will engage the friction facings first and the wave will flatten out as the pressure is increased. The above methods of providing yieldability offer the following advantages: (1) By the proper selection of disk material the element of yieldability can be made permanent and therefore independent of the facing material; (2) A facing material of high heat resisting quality may be used which also has high wear resisting qualities and therefore is particularly adapted for heavy duty service; (3) Because of the use of slow wearing facings the clutch may be made non-adjustable.

Conditions Severe in Bus Service

The ability of the clutch to absorb and radiate heat at a rapid rate, Mr. Wemp said, is a subject which has not been given sufficient attention. From this point of view conditions are most severe in bus operation. In congested districts the clutch of a bus is used almost continuously and mechanical energy is being converted by it into heat at a rapid rate. The author's firm has been investigating the

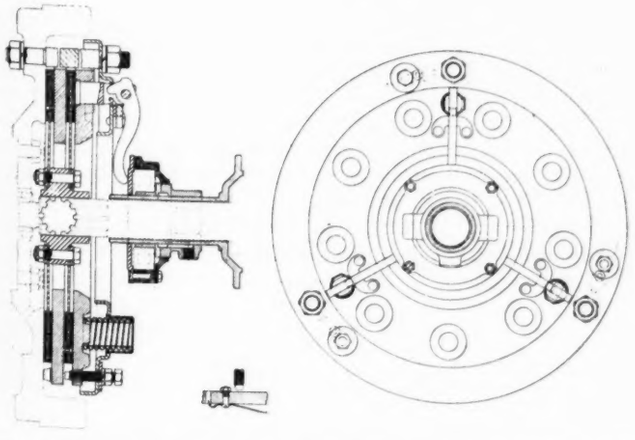


Fig. 3—Heavy duty type of clutch showing how driving disk overlaps facing on the inside and outside

problems involved for the last four years and has reached the following conclusions:

1.—Failures of facings result from high temperatures, and if means are provided to carry off the heat and keep down the temperature, the unit pressure on the contact surface is a matter of minor importance and generally can be materially increased!

2.—Even for heavy duty service a single or two-plate design has much to commend it, as the facilities for heat dissipation can be made better.

3.—The metal which absorbs the frictional heat directly should form part of the flywheel mass; this involves that the facings be applied to the driven disks, and although

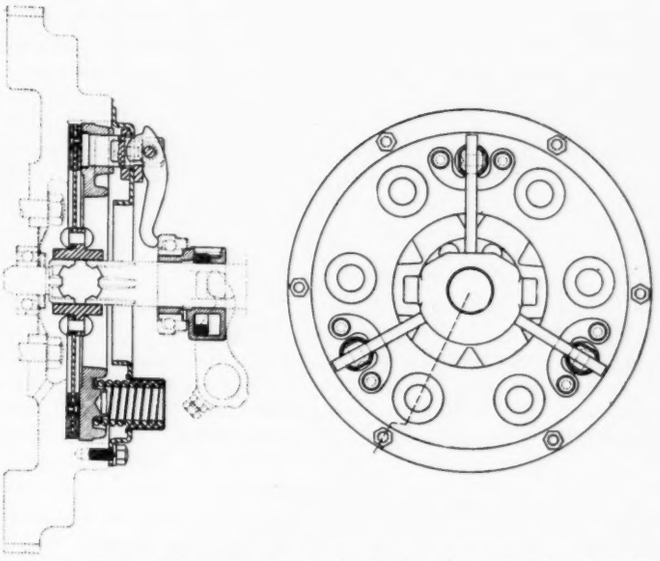


Fig. 4—Passenger car type of single plate clutch, showing provisions for permitting the circulation of cooling air

this adds to the inertia of the driven member, a compensating factor is that the driven disks themselves can be made very light.

4.—Cast iron is the best metallic frictional material to work together with the facings, its free graphite having a slight lubricating effect and permitting the surfaces to attain a high polish. Steel disks in a heavy duty clutch should have a high carbon content and preferably be heat-treated to such hardness that they will not scuff. Low carbon disks in heavy duty service will scuff; that is, steel fibers will be detached in service and will embed themselves in the softer facing material, and these embedded steel particles, acting as an abrasive, will further roughen the surface of the steel disks. Cast iron has the advantage over steel in that if all the weight needed for heat absorption is to be provided, it can be more easily worked and therefore comes cheaper.

5.—Two elements are provided in the design of the clutch to take care of heat dissipation. A considerable mass of metal is provided in the driving disks to act as a heat reservoir, and the heat radiating surface is enlarged (see Fig. 3). This is accomplished by extending the driving disk beyond the facing, both inwardly and outwardly. Two paths for heat flow are thus provided, inwardly and outwardly, which help in keeping the temperature of the engaging surface of the facing below the critical point.

The Radiation Ratio

The ratio of the surface of the driven disks not covered by the facing to the total surface is the radiation ratio of the clutch, and this must be increased with increase in the severity of the service. As an aid to heat dissipation it is recommended that inlet openings be formed in the sides of the bell housing and at least one outlet opening near the periphery of the flywheel, to take advantage of the fan action of the revolving clutch and flywheel.

This system is open to the objection that it allows dust to be drawn into the bell housing by the fan action. However, in heavy duty work the throw-out bearing should be housed in, and the dust will not do any great damage to the rest of the mechanism. The advantages of the system outweigh this disadvantage.

The clutch shown in Fig. 4 was designed specially for motor bus service and is for use with an engine of 4,500 lb.-ins. torque. The center and outer driving disks weigh more than 32 lbs., which gives an idea of its heat absorp-

tion capacity. These two members absorb 75 per cent of the heat generated, the other 25 per cent being absorbed directly by the flywheel.

One of the advantages of the single or two-plate type of clutch is that the flywheel constitutes a driving disk and absorbs directly 50 per cent of the heat liberated in the single plate and 25 per cent in the two-plate type. Its great heat absorbing capacity and large radiating surface make it ideal for this purpose.

Passenger Car Clutches

As regards surface radiation, in the design shown the center drive plate presents the greatest problem, inasmuch as it must handle 50 per cent of the frictional heat. It has a radiation factor of 53 per cent, which is very high compared with general practice in clutch design, but additional experience in heavy duty work may indicate that it will have to be increased still further. The radiation ratios of the flywheel and the rear drive plate, each of which handles only 25 per cent of the heat, are much greater, thus providing an additional factor of safety.

As regards clutches for passenger cars, a very satisfactory single plate design can be made. The heat generated can be readily dissipated. It is not considered good practice to completely enclose the clutch in the flywheel, and a method of air circulation through the clutch should be provided, one such method being illustrated in Fig. 4. Here the air enters the assembly through the central opening in the cover plate and is discharged through the open ends of the spring cups, at the same time sweeping over the rough radiating surface of the rear side of the pressure plate.

Cone and multiple disk type clutches automatically compensated for wear, and it was only when the single plate type of clutch, with its multiplying levers of considerable ratio, was introduced, that the need for adjusting means arose. For many years practically all designs of this type carried adjusting means and non-adjustable single plate clutches made their appearance only quite recently. This type was made possible by improvements in friction facings with respect to rate of wear and by decreasing the inertia of the driven member so as to make it unnecessary to use a clutch brake.

Allowance for Facing Wear

The design is laid out to allow the facings to wear down to the rivet heads without adjustment, except that the necessary lash between the clutch pedal and the toeboard must be maintained. This necessitates limiting the lever ratio to a maximum of 5:1, otherwise the sleeve travel required for release and wear-in becomes excessive. This limit on the lever ratio, the limit of allowable pedal pressure and constructional limits on the diameter of the driven disk are the factors which determine the maximum capacity of clutches of this type. It appears that the present limit of non-adjustable single plate clutches is an engine of 2,000 lb.-ins. torque. Beyond this either the driven disk must be of such large diameter and such great inertia as to make easy shifting impossible, or the pedal pressure required is too great.

Within its limit of capacity the single plate, non-adjustable clutch has advantages from both the manufacturing and the service angles. Its simplicity, ease of assembly and low cost appeal to the manufacturer, and the feature of non-adjustability eliminates the possibility of maladjustment by inexperienced mechanics. The same capacity limit does not apply to the non-adjustable two-plate design.

There appears to be a tendency toward push control and away from pull control, especially in single plate clutches. With the push control it is possible to build a more compact clutch, which in turn makes it possible to shorten the clutch housing (reducing its weight), to reduce the overhang of the transmission and to cut the cost.

In a push type control the clutch pedal shaft is normally located below the clutch center line, and this permits the use of longer clutch and brake pedals, both of which are desirable. The chief advantage, however, lies in the fact that when the crankshaft develops end play, the reaction of the releasing pressure causes it to be pushed forward to the limit of the end play, and this automatically establishes a positive clearance between the front clutch facing and the flywheel without necessitating the drive member to float back to obtain release (as required with the pull type of control).

Mounting of the clutch release bearing and its proper lubrication always have been one of the bugbears of clutch design. In the past the bearing generally has been mounted on the driven shaft, so as to be free to both slide and rotate on it, lubrication being provided from the supply in the transmission case through an axial hole in the driven shaft. In some designs the release sleeve is mounted on a rearward extension of the clutch housing. This has the advantage that both bearing and sleeve are independent of the driven shaft, but since both rotate at flywheel speed it is difficult to lubricate them. Hollow shaft lubrication from the transmission is usually employed in this case.

Release Sleeve Mounting

An important improvement in this connection consists in extending the front cap of the transmission in the form of a sleeve, and mounting the release sleeve itself upon this. Referring to Fig. 4, which shows one application of this idea, it will be noted that the release sleeve is entirely independent of the driven shaft. It may be held against rotation either by means of the throw-out yoke or by a pin extending from the transmission case. Since the release sleeve is non-rotatable it is an easy matter to provide either oil or grease lubrication, to both the bore of the sleeve and to the release bearing by means of a tube extending through the floor boards. By placing the oil seal at the extreme front end of the transmission extension it is also possible to provide for direct lubrication from the transmission without drilling the driven shaft.

Balancing of the clutch is required in order to reduce car vibration; it is as necessary as the careful balancing of the engine crankshaft and flywheel. Owing to the short over-all length, static balancing should prove sufficient with most clutches, but in case a balancing machine is available it is an easy and inexpensive matter to balance the clutch dynamically. In machining the flywheel it is necessary to maintain close limits on the bore for the pilot bearing, both as to diameter and concentricity. The mating clutch unit also must be held closely to size.

If the adjustment of the clutch involves angular motion of one or more members, this may cause unbalance even though the unit in its original assembly was perfectly balanced. This favors adjusting means that do not change the angular relation of the parts, as well as the non-adjustable type of clutch.

A GERMAN firm (Contessa Nettel of Stuttgart) has placed on the market a fuel meter for automobiles which registers the total amount of fuel consumed by the car and indicates the tank contents and the trip consumption. It comprises a tank with float and a counting or registering mechanism, on the outside of which there are two dials with pointers and one set of openings behind which appear figures on dial wheels, the same as in an odometer.

How Stress Distribution Is Determined by Photoelastic Method

Circularly polarized light when passed through model of part to be investigated, made of transparent material and similarly loaded, is modified, producing color bands indicative of stress.

*By A. L. Kimball, Jr.
Research Laboratory, General Electric Co.

THE photoelastic method is a means by which the stress in loaded structures can be directly determined by polarized light measurements on transparent models.

Polarized light is produced in the usual way, and is passed through the transparent model which alters the light in proportion to the stress at each point. When the transmitted light is passed through a suitable optical device, it may be projected upon a screen or upon a photographic plate, where suitable analysis of the colored image will give the exact stress distribution in the transparent model.

The process of measuring stress by the photoelastic method may be, therefore, divided into three parts—

1.—The construction of a transparent model of the body in which the stress distribution is to be found, of the same geometrical form as the body.
2.—The measurement of the stress distribution in this model by means of polarized light.
3.—The translation of this stress distribution from the model to the original body.

The models are usually made from transparent celluloid sheets from 3/16 to ½ inch in thickness. Celluloid is comparatively easily machined and has a reasonably high optical constant so that the required colored images can be obtained without the production of excessive stresses. Other materials such as glass or glyptol may be used, but thus far they have not been found to be as practical as celluloid. Celluloid has the disadvantage that it is apt to dry along freshly cut boundaries, thus producing internal stresses. This difficulty may be avoided by making measurements as soon as the model is cut or by keeping the model in an air-tight box containing some shavings of the same kind of celluloid as the model, so that a sort of balance of vapor pressure is maintained. The model has to be machined with care to prevent heating, a small amount of which produces edge stresses.

The stress measurements are made by means of a special optical set such as that shown in Fig. 1 and 2. This apparatus was designed by Prof. Coker and the writer for the General Electric Company and made by Adam Hilgar, of London, in the year 1920, and has been in constant service ever since.

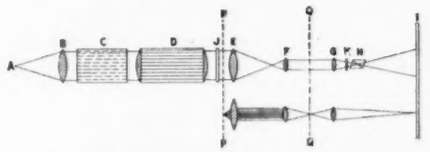


Fig. 2—Diagram of optical set showing path of light rays

Light from the source A passes through the condensing lense B, a water screen C and the polarizer D. The polarizer is shown in more detail in Fig. 3. The light is converged down to a narrow pencil of rays which passes through the Nicol prism of calcite. The water screen is necessary to prevent the prism from becoming overheated. When the light emerges from the polarizer it is plane polarized, or vibrating in one plane, as shown in Fig. 4 to the left.

But plane polarized light is not suitable for stress measurements, because it is affected differently depending upon whether the stress in the model is parallel or perpendicular to the light vibrations. The plane polarized light is therefore passed through the quarter wave plate J (shown enlarged in Fig. 4), which alters it so that it is circularly polarized. The quarter wave plate is made of a piece of doubly refracting crystal, which transmits vibration components in the direction AB with a different velocity from the components perpendicular to it. The plate is of such a thickness that one component is retarded one-fourth of a wave length behind the other so that when they combine circular vibrations are produced, as shown in Fig. 4.

Circularly polarized light is used for

*Paper presented at the annual meeting of the American Gear Manufacturers Association. Condensed.

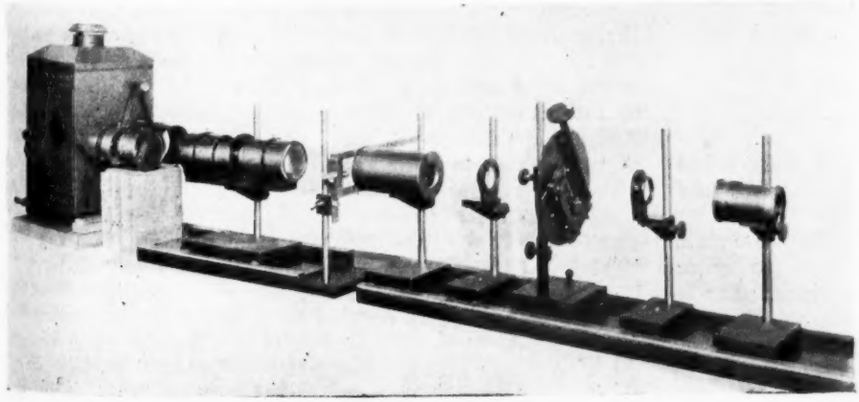


Fig. 1—Optical set

stress analysis. Because of its symmetry, circularly polarized light is equally altered for all angular positions of the stressed model in the equatorial plane.

The model is placed in plane P, Fig. 2. The lenses E, F and G are so arranged that a stressed model may also be placed in the plane Q, so that the color images from two specimens may simultaneously be superimposed upon each other if desired. The screen or the photographic plate is placed in the plane L. After transmission through the stressed members, the light is passed through the quarter wave plate K with its axis at right angles to the quarter wave plate J. This cancels the effect of the first quarter wave plate, which otherwise would appear in the final image. Finally the light is passed through a second polarizing prism or analyzer, after which it is brought to

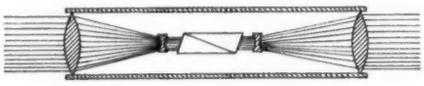


Fig. 3—Polarizer

focus on the screen, producing a colored image of the stressed specimen or specimens, the order of color of which at all points gives an accurate measure of the stress at the corresponding point in the specimen.

For instance, if a piece of celluloid an inch wide and 3/6 inches thick is placed in the plane P or the plane Q, when no stress is applied to it, its image will be dark. If tension is applied by means of a screw, the image passes through a series of colors, first yellow, then red, then blue, again yellow, red, blue, etc., which series may repeat four or five times. Thus there are first, second and third, etc., order colors, each color in the second, and third order corresponding approximately to two and three times the stress for the same first order color.

The same series of colors is passed through for the case of compressions as for the case of tensions. If a bending stress instead of a tension is applied to the specimen, the neutral axis appears as a dark line along the middle with rainbow color bands above and below this line corresponding to tension and compression, respectively, the second and third bands in each case representing two and three times the stress represented by the first band. For a more complex case of stress distribution the color bands will be correspondingly more complex.

A few words must be said about stress in general before explaining how the color bands are analyzed to give the

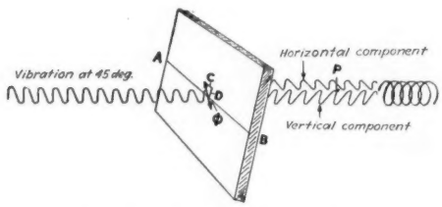


Fig. 4—Quarter wave plate

exact stresses. The stresses in any strained body follow along certain directions called the principal stress directions. Such a system of principal stress direction is shown in Fig. 5 for the case of an elliptical hole in a celluloid plate about six inches wide and ¼ inch thick, to which a tension has been applied in a direction perpendicular to the major axis of the ellipse. They are characterized by the fact that they make right angles with each other at all points and are everywhere parallel and perpendicular to boundaries.

Now, the effect upon the circularly polarized light at each point of the model is determined by the principal stresses P and Q at each point. It has previously been shown how in the case of the quarter wave plate the incident light is separated into two components at right angles to each other which are transmitted through the crystal with different velocities. So, also, the circularly polarized light incident upon the stress specimen Fig. 6 is resolved into two components, one parallel to the direction of the P lines and the other parallel to the direction of the Q lines each component being transmitted with a velocity dependent upon the magnitude of the principal stress to which it is parallel.

Evidently the light is not altered if the two principal stresses are of the same magnitude, because each component being transmitted with the same velocity they emerge in the same phase as they entered, and combine again to produce circularly polarized light. If one principal stress is greater than the other, however, a difference in the velocity of transmission of the components is produced, which is proportional to the difference between the two principal stresses P and Q

$$D = C(p - q)$$

where C is a proportionality factor.

So also the color produced on the screen depends upon $P—Q$, in fact, the color bands give a direct measure of the principal stress difference $P—Q$ at all points. Thus when the value of one of the principal stresses is zero or is small compared with the other, the color bands give a direct measure of the stress at the point observed.

Now, it will be recalled that principal stress lines are always normal and tangent to boundaries of a stressed body. Evidently the principal stress normal to the boundary must vanish at the boundary, as there is no material

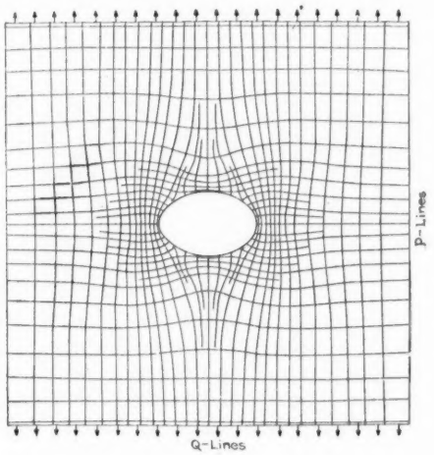


Fig. 5—Principal stress lines

to support a normal tension or compression at a boundary, therefore, the principal stress difference $P—Q$, upon which the color bands depend, becomes equal to the tangential stress at a boundary, so that at boundaries the amount of the stress can be directly determined from the color. Since in practically all cases the maximum stresses occur at boundaries, a simple color measurement will at once give the maximum stress. The simplicity and ease with which maximum stresses can be observed in the photoelastic model are thus apparent.

There are two ways of evaluating the observed colors in terms of stress. One is to construct a color-stress scale by applying a known tension to a sample of known cross section made from the same sheet of celluloid from which the model was made. The latter precaution is necessary as the optical properties of different sheets of celluloid may differ.

The other way to evaluate the stress is by a method of

cancellation. A tension member like that just described, to which a known load is applied is placed crosswise to the direction of the stress to be measured in the second focal plane Q, Fig. 2. When the stress upon it is the same as the stress to be determined, the superimposed images give a black spot at the point under observation. The color effect is cancelled out. The comparison tension member is held in a special frame shown in Fig. 1 and enlarged in Fig. 7.

The color method is useful for rapid observation of maximum stress points where the order of color is high. The cancellation method is the more accurate for ordinary cases, however.

The method outlined gives complete stress measurements for boundaries.

The stress in a body is completely known when the magnitude of both principal stresses and their direction is known for every point in the body. For complete determination of stresses within boundaries further observations are required besides a determination of the principal stress system like that shown in Fig. 5.

When once the stress in the model is determined the translation of the results to steel is a simple matter. This is so because in all true elastic bodies similarly loaded the stress distributions are similar. Altho the absolute value of the stress is far less in the celluloid than in the steel,

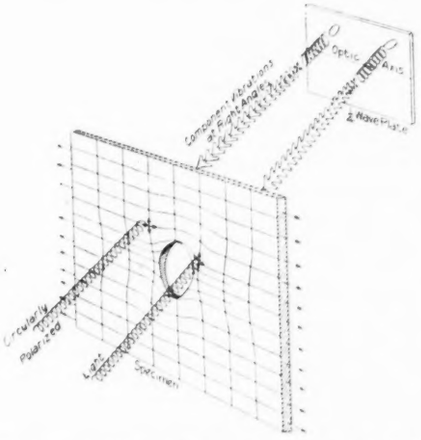


Fig. 6—Action of stress on polarized light

the stress *distribution* is the same. The celluloid model will perhaps be loaded only 1/100 as much as the steel.

To find the stress in the steel, multiply the stress at each corresponding point by 100. To take a simple case, a deflected beam of celluloid and a deflected beam of steel similarly loaded evidently have the same stress distributions although the elastic modulus of steel is some 100 times higher than that of celluloid. Furthermore, the mathematical equations of stress distribution, where the stress directions lie in one plane, show that for all ordinary cases the stress distribution is independent of the elastic modulus. Verification of the truth of the mathematical theory within the limits of experimental error has been obtained many times by the photoelastic method for celluloid for cases which are also subject to mathematical calculation. There is no more reason why celluloid should satisfy the mathematical requirement than steel.

In order that there be no misunderstanding, a word should be said about the limitations of this method. In using results obtained by the photoelastic method:

1. The results can be applied only to cases where the stress is below the elastic limit so that Hooke's law that stress is proportional to strain is obeyed and no plastic yielding has taken place.

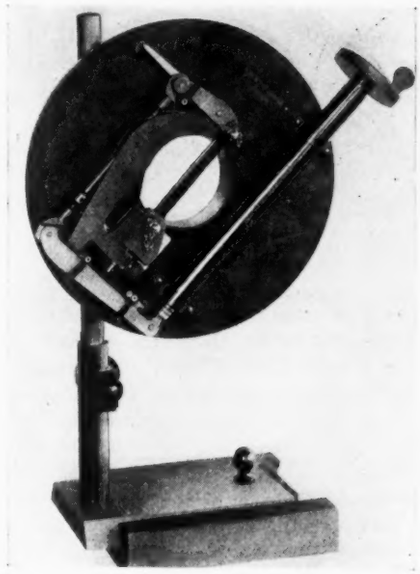


Fig. 7—Frame for comparison tension member

2. The stresses obtained do not include possible initial stresses which may exist in the steel member.
3. The body is assumed isotropic. The crystalline structure must be small compared with the boundary irregularities.

These requirements are indeed none other than those of the usual engineering methods of the calculation of stress.

There is another fact that must be clearly grasped by those interested in the application of this method, and that is that the photoelastic method in its present state of development will only analyze the stress distribution in one plane taken perpendicular to the direction of the light rays. Such problems as torsion in shafts and stresses in helical gear teeth are not readily handled by it. Many problems, however, can be readily treated as cases of stress in two dimensions, and for the solution of these problems photoelasticity is a most effective tool, and gives far more reliable results than any method hitherto obtained.

A very beautiful application of the photoelastic method can be made to spur gears, because in this type of gearing the stress lies in a single plane. The stress distribution in models of celluloid will give an accurate representation of that in the corresponding steel gear wheels.

Two types of gear pinions, illustrated in Fig. 8, were examined under static load. Fig 9 shows the system of principal stress lines as determined by photoelastic observations for design A, Fig. 8. The load was applied at the point marked by the arrow, by another, exactly similar

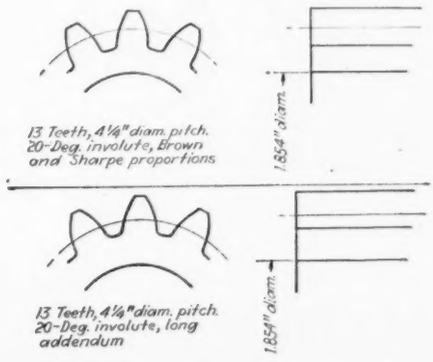

13 Teeth, 4 1/4" diam. pitch.
20-Deg. involute, Brown and Sharpe proportions
1.854" diam.
13 Teeth, 4 1/4" diam. pitch.
20-Deg. involute, long addendum
1.854" diam.

Fig. 8—Gear designs

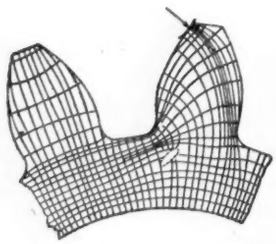


Fig. 9—Principal stress lines in loaded gear tooth

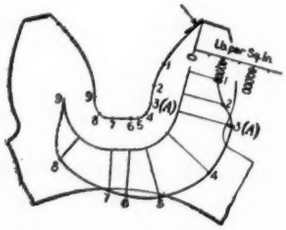


Fig. 10 — Boundary stress, tension side

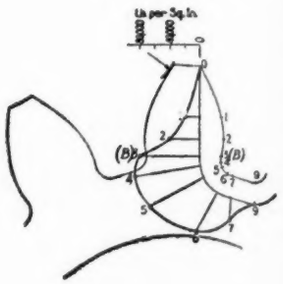


Fig. 11—Boundary stress, compression side

tooth. Fig. 10 shows the tangential stress along the boundary of the tooth on the tension side. The stress magnitudes at points 1, 2, 3, etc., are graphically represented by the lengths of the radial ordinates of the curve.

The maximum compression is somewhat greater than the maximum tension. In both cases the maximum stresses occur in the fillet at the root of the tooth. It is generally borne out by photoelastic observations on many different designs that internal angles and fillets are apt to be points of high local stress, and the sharper the internal angle the greater the stress. The maximum in the cases shown is seen to be some 80,000 lb. per sq. in. Design B was compared with design A through maximum stress measurements only. The results were as follows:

For design A, max. stress=80,000 lb. per sq. in.

For design B, max. stress=70,350 lb. per sq. in.

These stresses correspond to the highest load to which the pinion would ever be subjected in service due to tractive effort. They are considerably higher than those given by the usual methods of calculation for the same load, but photoelastic measurements show them to be of quite local character and near the surface.

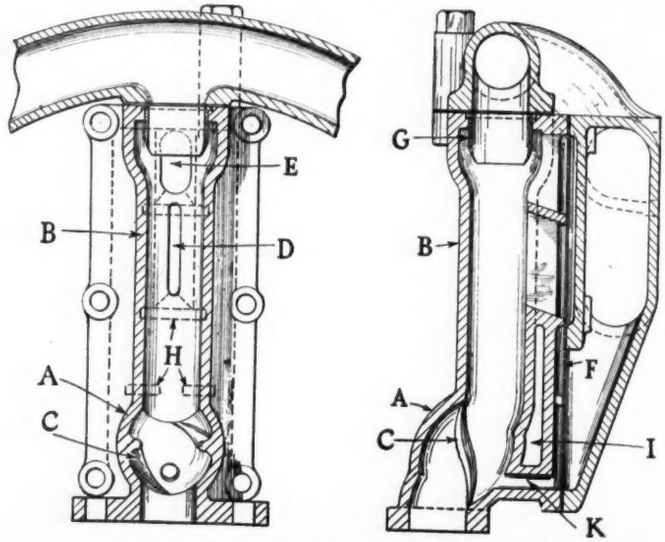
Improved Vaporizing Manifold Increases Power

AN improved type of manifold designed to overcome the difficulties arising from the increase in the end point of motor fuel has been invented by Harold S. Lamb Los Angeles, Cal. The principle on which the new device works is that the heavier particles of the fuel which remain unvaporized as the mixture ascends the inlet riser above the carbureter are separated by centrifugal force and led into a vaporizing chamber, where they come in contact with one face of a vaporizing plate of sheet steel, which receives its heat from the exhaust gases.

The vaporizer comprises a bulbous portion *A* merging into the riser *B* and is provided with helical ribs *C* which impart a swirling motion to the mixture and cause the unvaporized particles to separate out. The two outlets from the riser shown at *D* and *E* serve to convey the liquid fuel to the heating plate *F*. This latter is in two sections, the upper portion being shielded against the direct heat of the exhaust gases by an air jacket, while the lower portion is directly exposed to these gases. At the lower end of the vaporizer there is a return passage *K* to the riser.

When the engine is running under light load the full heat of the exhaust is required to vaporize the heavier ends of the fuel, and the liquid particles separated out will then descend to the lower part of the vaporizing plate which is in direct contact with the exhaust gases. On the other hand, when the engine is running under full load, the heat of the upper part of the vaporizing plate, which is protected by the air jacket, is sufficient to vaporize the fuel. The separated liquid particles come in contact with this part of the vaporizer plate first and under the conditions mentioned they never reach the lower part.

We are informed by Mr. Lamb that two manifolds of this design have been used on cars for more than a year and three others have been in service for about six months. Two of the manifolds are in use on towing cars of repair shops and the others on passenger cars. The operators, we are informed, all testify to improvement in power, economy and flexibility.

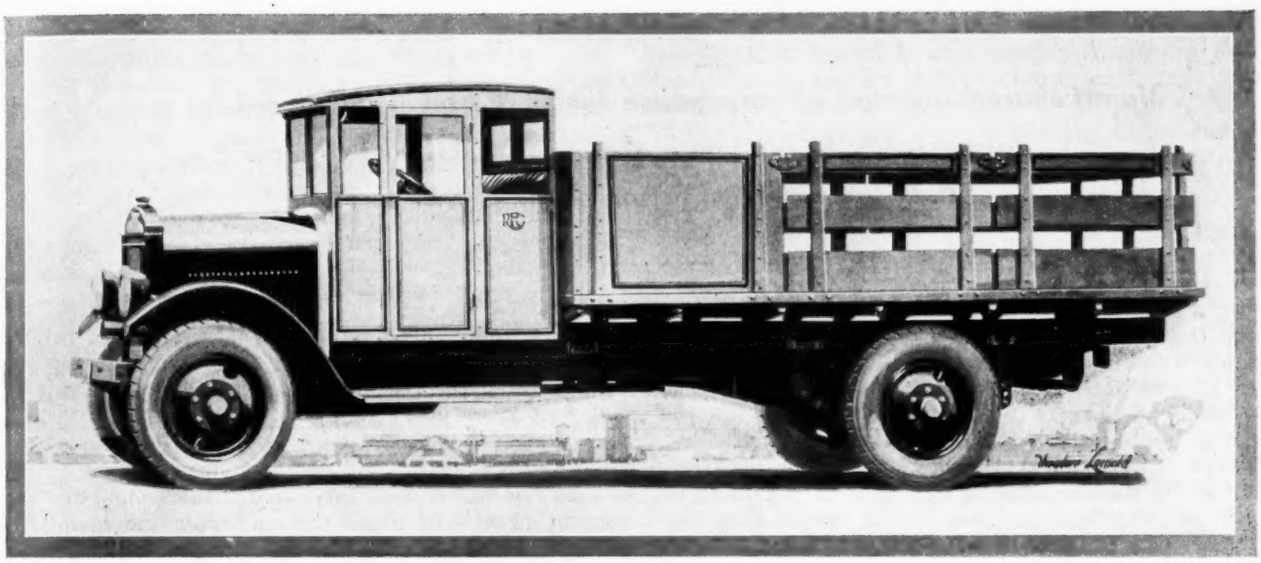


Sectional views of Lamb vaporizing manifold

IN a paper on Aircraft Engine Design published by the National Advisory Committee for Aeronautics, the author, E. E. Wilson, says that in the matter of durability considerable progress has been made. For a long time the average life of the Liberty engine between overhauls was considered to be 50 flying hours. Improvements and development have increased this time by nearly 100 per cent. In the newer types of engine this limit is greatly exceeded. There are two Wright T-2 engines in the PN-7 which have had over 300 hours of flying without major overhaul and they are still in excellent condition.

THE Duesenberg racer of De Paolo which won the Indianapolis race on Decoration Day was equipped with rubber shock insulators both front and rear, and Shafer's Duesenberg, which came in third, also carried these shock insulators.

Reo Enters the Two-Ton Truck Field



The new Reo Model G 2-ton truck

Heavy-duty "Speed Wagon," the Model-G, is Introduced. Has a 6-Cylinder Engine—Priced at $1985.

A BIG brother to the Reo Model F 1¼-ton Speed Wagon in the shape of the Model G 2-ton Speed Wagon has just been brought out by the Reo Motor Car Co., marking the entry of the Reo company into the field of heavy duty trucks.

The heavy duty Speed Wagon, which has a wheelbase of 156 in., 28 in. longer than the Model F Speed Wagon, and which is built to sell at $1,985 f.o.b. Lansing, is equipped with the 6-cylinder Reo T-6 passenger car engine, the cylinders of which, cast en bloc, have a bore of 3 3/16 in. and a stroke of 5 in., as compared with the Model F, which is equipped with a 4-cylinder 4⅛ by 4½ in. engine with the cylinders cast in pairs.

The rated horsepower of the T-6 engine is 24.3, but it is capable of developing 50 hp. at 2000 r.p.m. The intake-in-head, exhaust-in-side form of valve arrangement familiar in the engine of the Model F is also used in the T-6 engine. The front end drive from the T-6 differs from the Model F engine in that the crankshaft and idler gears are non-metallic. Lynite aluminum alloy pistons are used and the 4-bearing crankshaft is drop forged from manganese steel. Lubrication of the engine is by pressure to the main bearings, obtained by a piston pump, and by splash to the other parts.

Same Gearset Is Used

The three forward speeds give a final gear ratio of 21.0 to 1 for low speed, 10.3 to 1 for the intermediate and 5.7 to 1 for high speed, the reverse being geared at 28.6 to 1. The gearset in the Model G is identical with that in the Model F, the same gear ratios being used, the increase in the final ratio from the Model F being due to a change in the differential gearing, in which the ratio was increased from 4.7 to 5.7 to 1. A 3-joint propeller shaft is used to transmit the power to the chassis.

The Reo practice of suspending vital chassis parts in the inner frame is again followed, the inner frame being swung from the main frame on four points, with the engine suspended well below the main frame, nearly on the level with the transmission units. The top of the frame itself is but 31¾ in. above the ground, giving a low center of gravity.

The side members of the chassis are pressed from ¼ in. cold rolled steel 5½ in. deep, the central cross members, of which there are six, forming, with the 2¼ in. cross tube at either end, a powerful bracing for the frame. The front axle is 2 in. wide at its narrowest point, flares out to a width of 4⅛ in. at the spring seat rests, and is 2¼ in. thick, the I-beam section being drop forged from a single piece of heat treated carbon steel.

The rear springs, which are of the semi-elliptic type, have been increased to 50 in. and the width of both front and rear springs has been increased a quarter of an inch over the type used on the Model F Speed Wagon. Zerk chassis lubrication is used throughout.

Rear Springs Are Longer

The brakes, which, as on the Model F, operate on the rear wheels but differ from the passenger cars in that the emergency is hand operated in G truck, have a total brake area of 558 sq. in. A specially designed steering gear with heavy gears and shafts is equipped with an intermediate gear to absorb road shocks, the steering gear housing being attached to both inner and outer frame members.

The equipment includes a Schebler Model S 1¼ in. carbureter, a Willard 111 amp. hr. battery, front bumper, tire carrier under rear end of frame, 32 by 6 in. Budd disk wheels and 32 by 6 in. front and 34 by 7 in. rear tires.

The chassis weight is 3900 lb., as compared to 2705 lb. for the Model F. The Reo company has been operating a number of these Model G trucks experimentally before finally putting them in production.

National Body Suggested to Coordinate Employee Training Efforts

Manufacturers warned of impending labor shortage and urged to give deeper study to systematic training of skilled workers. Plan for concerted action outlined by expert.

SOUNDING the warning of an impending labor shortage, and pointing out the need for systematic training of skilled workers if American industry is to have adequate manpower to compete successfully in the future with the industries of other nations, L. A. Hartley, Director of Education, National Founders Association, speaking at the annual meeting of the U. S. Chamber of Commerce at Washington, May 20-22, made five concrete suggestions for dealing with the situation:

His suggestions were that:

1—There should be a national department of training functioning for employers entirely apart from Federal departments but cooperating in specific projects with Federal and other agencies just as cooperation in the campaign for simplification and standardization has been carried on with the Simplified Practice Division of the Department of Commerce and the American Engineering Standard Committee.

The function of this department should be to stimulate interest in employee training upon the part of national industrial organizations and individual plants and to assist, upon request in the planning of training departments in these organizations and plants.

2—Every manufacturers' group and employers' group should maintain an employee training committee, the aims of which would be similar to those of the national department.

3—This national department and the committees in these associations should form the nucleus of a National Industrial Training Association whose chief aim would be to promote training on the job beginning with the upgrading process. The secondary aim would be to cooperate with those public and private educational enterprises which could be helpful.

4—Material on the subject of employee training should be prepared and made available to all industrial managers throughout the country. This should set forth the need in constantly revised data on the employee training situation and should include also definite suggestions for various methods of erecting systems of training on the basis of what may already be in existence in each center. These plans should recognize the training needed both for mechanical skill and for supervision.

5—A cooperative arrangement should be made with one or more of the great universities to carry on a comprehensive study of training methods. The results of these researches should be published in sections, the first to deal with methods which are adaptable to the average plant which at the present time must train its workers under average conditions. Later sections should cover specific fields in which the results of research, experiment and experience would be made broadly available.

Going on with his discussion, Mr. Hartley said:

"While there is no reason for pessimism at this time, every one who is interested in American industry should bear in mind the recent statement of a well-known financial writer, 'if every industry in this country attempted to run at full capacity there would not be nearly enough labor to go around.' An employment manager whose interests are nation-wide estimated a short time ago that a general increase of 15 per cent in production would absorb all available labor. It may be thought that the normal increase of population which is theoretically the difference between our death rate and birth rate will relieve all need for apprehension regarding the effects of restricted immigration on labor supply. It is not the number of persons however, we must consider. If this were the case we would be hopelessly outnumbered. It is unit productiveness and the market with which we are concerned.

Encourage Agencies Now in Field

"In the training of employees, employers should encourage every agency now in the field which can assist them and should search for the best plans which can be built upon their present foundations, but employers must not forget that what is everybody's business is nobody's business. Employers must take this job of employee training in hand themselves just as they would deal with the probable shortage of any other kind of materials.

"One great lesson is gained from a study of the various plans for employee training which with greater or less success are operating in different places. The lesson is that in order to build securely we must build on existing foundations rather than try to erect an imposing structure upon a borrowed foundation. Furthermore it must be realized that every business worthy of the name has some kind of a system of training functioning at the present moment. Frequently this is an upgrading process. It has probably met the needs of the past and is meeting to some extent the needs of the present.

"Our real problem is to help the plants with these various systems prepare themselves better to meet the situation of the immediate future and to anticipate the growing needs of American industry.

"Of one thing we may be certain—if the thousands of employers of different grades of foresight and experience are suddenly faced with a declining labor market, many of them will follow the line of least resistance and begin to bid with one another for help. If this condition of industrial piracy is to be avoided, measures should be taken at once to systematically develop an interest in training upon the part of every employer in America.

"We must not mistake the machinery for the spirit of training. The greatest locomotive without energy in active form is of no account. The spirit of training is the first important consideration. If the spirit is present the

machinery is always to be found or can be developed in every shop.

"In this connection it must be emphasized that any plan of employee training is finally dependent upon the interest of the supervisory group. There is only one kind of person who can comprehend industrial problems. This is the person who has had or is having industrial experience and who, in addition, is trained to understand the human factor and the principles of industrial organization.

"If there is reason for training youth in the practice of the operations of industry and for giving them instruction in the subjects closely related to these processes, there is certainly more reason for training those employees who are responsible not only for industrial processes but in large measure for industrial relations and for the understanding between the management and workers. This cannot be accomplished merely through training in apprenticeships or through college courses for engineers.

"The time to begin the training for foremanship is while the man is learning the occupation and while his mind is plastic. Let us not forget that the age of plasticity differs with individuals—one person may learn more eagerly at fifty than another at twenty-five. This training of foremen must be continued on the job afterwards and should be continuous throughout their supervisory experience.

"If American industry is to build for the future, we must extend our efforts to develop a high grade type of foreman. Certainly we must do what we can for the unchanging type of foreman who will soon pass on but we must look for our best results to the promising young men who are receiving pre-foreman training while learning their trades, to the college graduates who are willing to spend the time in industry necessary to gain a first hand experience and to those highly skilled workers who as foremen today are eager to pass their training on to the younger workers. In all cases foreman training on the job is needed.

"It is well to observe here that many of the foreman training activities being conducted at present throughout the country are open to considerable question as to permanent methods. The success of the short, intensive foreman training conferences is due very largely to the fact that the present methods of foremanship have been so generally poor that almost any kind of a discussion of present problems is helpful. These conferences should be looked upon as palliative measures in industry.

"There are three great factors in industry—materials, equipment and man, and of these man is the greatest. A man who for many years has been at the head of a large factory in Indiana operating what is known as the best equipped plant of its kind in that State said recently that fifteen years ago he had practically ceased to take personal interest in analyses of materials. The materials analyses are now cared for by experts who have research laboratories and who are continually receiving new information from college and commercial laboratories which have grown up to serve the need. This man also said that while he always bought every piece of equipment which could be demonstrated to pay for itself he had practically ceased worrying about equipment ten years ago. New equipment is added occasionally but he feels that so far as his plant is concerned the equipment factor is solving itself.

"The point is not that materials and equipment are no longer of concern but that every man in the industry is now thinking materials and equipment and the development of these factors is natural and continuous. It has become a business of itself.

"The human factor is the remaining factor and is almost wholly undeveloped. There is a limit to which materials and equipment may be developed. There is no known limit to the possibilities of the human brain. In the words of Victor Hugo, 'There is just one thing stronger than an army—that is, an idea about to be born.'"

Questions for Manufacturers

In conclusion, Mr. Hartley propounded a set of questions for manufacturers to ask themselves as a basis for the formulation of employee training systems which would meet the individual requirements of their particular business or industry. These questions follow:

1.—What is the average age of your highly skilled group? Of your supervisory group?

2.—What percentage of increased production would absorb the available labor supply in your community? In your industry?

3.—What would you do if you were unable to get unemployed workers on the labor market and you needed more men at once?

4.—What would be the effect of a declining labor market on industrial unrest?

5.—What does an employer owe to his faithful skilled employees who have grown old in his business, besides fair wages, good working conditions, steady employment and possibly group insurance and pensions?

6.—How long would be required to train a worker to replace a highly skilled worker in your plant? A foreman?

7.—What are the minimum age and physical qualifications for production employment in your plant? In your industry? How does this affect your supply of labor?

8.—Why do many industries have difficulty in getting high school graduates to take up production operations?

9.—What do your workers see in their jobs?

10.—What are the schools of your community doing to help solve your labor problems?

11.—Who should plan a training program for a plant?

12.—Is there any effort made in your plant to develop a group who will reflect the management to the workers and the workers to the management?

13.—What should be expected of a training system such as could function in the average plant?

14.—How could your present training methods be improved?

AMONG industries of the nation, that of motor vehicle and accessory manufacture stands near the top in the number of employees engaged. A vast army of 750,000 workers!

Probably no other industry requires so high a percentage of skilled workers.

No other industry has so many gigantic plants, each requiring thousands of men to operate.

For these reasons the subject of employee training is of special interest to automotive executives. They will find in the article presented here a number of useful suggestions along this line.

Here and There in Foreign Markets

By special arrangement with the Automotive Division, Bureau of Foreign and Domestic Commerce

Persian Customs Lifted

ACCORDING to a Persian Government bill, which was passed last Jan. 7, motor trucks and buses will for a period of five years be exempted from customs duties. This will materially aid Persia in solving her transportation problem because it now appears that much-needed railway construction will be postponed to the distant future.

Orders Developing in Hungary

AN unsolicited demand for at least 500 American cars exists in Hungary, it is announced by the Automotive Division of the Department of Commerce, which declares the popularity of the American car has been well established in this country. "In Budapest alone," continues the announcement, "more than 1000 horse-drawn vehicles are shortly to be replaced with automobiles. The performance of motor trucks on the few delivery routes established has been most satisfactory, and enlargement of the fleet awaits only the laying down of new roads, which is now being demanded by the agricultural and industrial interests of the country."

German Production Increasing

THE Benz and Mercedes companies of Germany, which fused their interests about the middle of 1924, are reported as interested in sending engineers to the United States shortly for the purpose of studying processes and equipment for making steel forgings and pressings. The Opel Works are now building their 5-hp. copy of the Citroen at the rate of 50 daily, and expect to reach the production of 100 daily within a few months. After this production is reached, this company expects to build a 10-hp. car which it plans to sell at the relatively cheap price to the customer of 7000 marks ($1,679, approximately). The Aga Works are also contemplating production of 100 cars daily. Another conspicuous example of mass production is the Brennabor Works at Brandenburg, now producing two models of 6 and 8 hp. respectively. At present this company is producing 16 of the 6-hp. and 10 of the 8-hp. models daily. Of the total 1924 German imports of passenger cars, amounting to 4827, only 825 were American.

American Cars at Geneva Show

TWENTY American car manufacturers exhibited at the recent international show in Geneva, Switzerland. The cars displayed were Buick, Cadillac, Chandler, Chevrolet, Chrysler, Cleveland, Dodge, Essex, Gray, Hudson, Marmon, Nash, Oakland, Overland, Oldsmobile, Packard, Pierce-Arrow, Rickenbacker, Rollin and Studebaker. Only one country, France, ranked ahead of the United States in the number of makes at the show. Twelve Italian makes were shown, and nine English makes. The sales of American cars in Switzerland last year exceeded those of 1923 by 100 per cent.

Austria Needs Credit Capital

THE ability to establish an automobile paper house in Austria for financing automobile time payments, the purpose of which would be to relieve the buyers of the excessively high interest rates which are charged locally under present conditions, seems contingent on the bringing in of outside capital. There are no funds available in Austria for carrying out such a scheme, much as it is needed.

Competition Tightens in Switzerland

THE Geneva, Switzerland, automobile market experienced a noticeable increase in competition during the past year which took the form of increased advertising, the moving of agencies to more appropriate quarters and a certain amount of price cutting. An increasing number of new makes entering this market, especially American, had considerable to do with these conditions. The matter of further price reductions is interesting, in view of the current rumor that Fiat prices will be reduced soon by from 10 to 20 per cent. Such action would bring about a readjustment of all automobile prices, but should least affect agencies handling American makes because these are believed to be in a better position than those handling European cars to make further price reductions.

Imports Heavy at Rio de Janeiro

AUTOMOBILE imports at Rio de Janeiro were unusually heavy during March, amounting to 845 cars, of which 843 were American and two Belgian, the Automotive Division of the Department of Commerce announces. The large increase in imports at this port is due principally to port congestion at Santos. When transportation conditions are normal, Rio motor car dealers import through Santos, as the two per cent gold port tax is not collected at that port.

One American motor car company in Rio established a record, delivering 176 cars during February this year, the largest sales for one month in the history of this company.

English Papers Use American Trucks

IT is interesting to note that two Liverpool, England, newspaper companies in recently changing from horse to motor transport for the delivery of their papers adopted cars of American manufacture as their choice. One company has started with 12 light cars and the other with 15. The editor of one of the papers states that after two months' experience with the new form of transport their earlier hopes regarding savings have been more than confirmed.

Convention Speakers—

One Kind Just "Orates," the Other Kind Has Something to Say

THE value of sales conventions must be judged by the influence they have on the future selling activity of those who attend rather than by the amount of noise made during the sessions or the quantity of liquor consumed between times.

Which do you want taking up the time of your salesmen?

One of the noisiest sales dinners we ever attended left far less real impression on the men who were there than did some others in which the activity was mental instead of physical.

A certain amount of artificial stimulation (not necessarily liquid) of pep is essential, of course, at gatherings of this kind. But after all the minds of the men have to be jarred into action before the meeting can begin to accomplish its real purpose—that of stimulating men to sell more goods.

The success or failure of a sales gathering can be determined better a week after it is over than immediately following the last session.

The big question is, "How much urge to set new records still remains seven days afterward?"

The level-headed business talk is what sends the salesmen home from a convention with the ammunition they need to carry on their work

One time there was a sales convention at which were present about 150 men. On the program were two chief speakers. One of them was a thoroughly good platform talker. He wasn't obtrusively oratorical, but he had that rare power of getting an audience under his spell and holding it there.

At this particular meeting he was in rare form. He caught the interest of his hearers at the beginning and carried them along clear to the end of a 40-minute talk. He told them many things about sales which practically every man in the room already knew. He outlined those phases of the industrial situation which were thoroughly familiar to all those present. He didn't confuse his auditors' minds with any new ideas; all they had to do was to sit and listen to the music of his voice and bask in the unquestioned charm of his personality.

When he finished his hearers arose in a body and applauded him for several minutes.

Then came the second speaker. He spoke clearly, distinctly and directly, like a level-headed business man. He was not hard to listen to, but his platform presence in no sense compelled attention.

After a few introductory remarks he plunged into the meat of his talk. He told the salesmen before him how they could get better results from their efforts. He cited specific examples of successes and failures, based on problems such as each of them met every day. He put his finger on the fundamentals underlying the business situation as it existed at that time and told the salesmen what those fundamentals meant to them in the work they were going out to do the next day. His talk bristled with facts; he used charts and ventured to prove his points with statistics.

He finished his talk. The audience accorded him a cordial moment of hand-clapping. But nobody let out an involuntary cheer; nobody knocked over a glass of water in his eagerness to be in the vanguard of applause; nobody got excited.

It was generally agreed after the session that the second speaker was good but that the first speaker had been the real knockout of the evening.

And everybody went home reasonably happy, considering the great fight the U. S. Navy had been making against the rum runners.

Two weeks later four of the men who had been present at that meeting were lunching with two others who had not. The conversation turned to business topics. One of the men who had not been at the meeting said, "Here's a tough one I've been trying to solve for some time. See if any of you fellows can give me the answer?" Then he went on to tell his problem.

He got an answer to his question. And it came by way of quotations from some of the facts which had been presented two weeks before by speaker No. 2. The conversation then turned naturally to the sales meeting.

Of the four men who had been at the gathering not one could remember a single thing that had been said by speaker No. 1. They still agreed he had made a fine talk, but had no idea of what he had said. Every one of them remembered at least one thing that had been said by speaker No. 2; and the points which were remembered furnished the basis for the rest of that particular meeting of the Three-Hours-for-Lunch Club.

This incident is related because it is typical in several ways of what happens many times at sales conventions. Speaker No. 1 perhaps performed a useful function at the session noted, but after all it is the No. 2s who are building better sales organizations.

The real purpose of a talk before a sales convention is to stimulate to thought and to business activity the men who have been brought together; it is not to gain long applause or personal glory for the speaker.

Some men can achieve both of these ends at the same time—a highly desirable combination. But the end should never be lost to view in the activity expended to reach it. What counts is the effect the speaker's ideas have on his audience, not the personal impression he makes. All this is said in full recognition of the fact that personality is a great help in impressing ideas.

Stock Prices Today Give Little Merely Reflect

Recent advance of motors based almost wholly on present condition and profits of the industry.

By Harry Haviland Sibley

IT is unfortunate, but true, that the great majority of manufacturers and business men have come to look upon the fluctuations of prices upon the New York Stock Exchange as a true barometer of the future. Unfortunate, because few people, even in Wall Street itself, realize that in the present disrupted economic position of the world stock prices tend to synchronize with business rather than to forecast it.

The decline in the prices of motor stocks last March certainly did not forecast the very great demand for cars which has since developed, but, on the contrary, had it been taken literally, would have meant a disappointing season for this industry.

Big Business today is in the stock market as never before. When Big Business receives large orders with additional business in sight it buys its own stocks and the advance continues so long as orders are visible. Once there is any indication of a decline in activity in its particular line, buying stops and selling begins. This is true, of course, to a greater degree in some lines than in others, but because of certain fundamental conditions having to do with the relation of supply to demand, these periods tend to come swiftly, last for a comparatively short time and end suddenly. They are evanescent.

BECAUSE speculation is dynamic, not static, the stock market is filled with surface changes; price fluctuations of greater or less extent. Beneath these surface fluctuations is normally a definite trend in price toward either higher or lower levels due to the fundamentals of growth of the industry, the position of a given company in its industry or developments within the company itself. These, in turn, depend upon the economic position of the times—the position which business occupies in the "economic cycle" which has to do with gold production, credit supplies and all of those things which finally decide the spending power and well- or ill-being of the people as a whole.

So when someone asks, "What is the stock market forecasting for the motor industry?" there is just one reply—Nothing.

In the recent advance of the prices for most of the motor stocks there has been recorded not a forecast of the future but a registering of present conditions and profits. That these advances have been accompanied in some instances by rumors of mergers has not of necessity indicated that such mergers were being "discounted" by the advance. In no case has the stock which has advanced to the accompaniment of such reports advanced beyond the limit which might normally have been expected based upon the earnings reported.

BUT the earnings which interested pool managers give to the world are not, of themselves, an accurate guide to the selling level which might logically be expected. The aggressiveness of the speculators conducting the market operations are a more potent influence than earnings, for it is an old but true saying of the speculative mart that "You can't talk a stock up; buying is what does it."

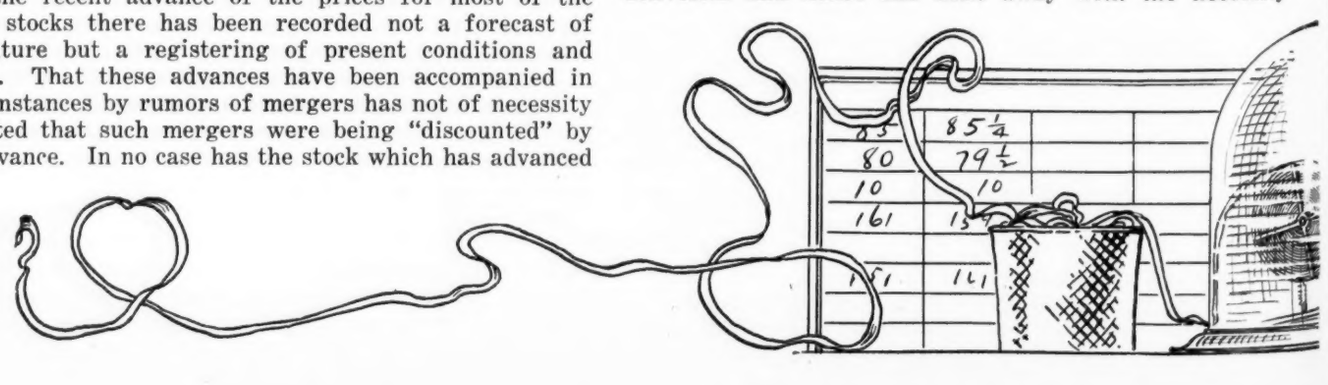
Advertise the stock upon the ticker tape with much activity and large volume and then rumor large earnings and that speculative public which seeks a nimble profit, yet knows nothing of the industry, will buy the stock at prices beyond the fairest dreams of the market operator.

These short, speculative movements in the stocks of the motor companies, coming each spring with the regularity of the season and repeating themselves in the fall, if general business conditions favor, are repeated in the stocks of companies in other industries. For several years these spasmodic, comparatively short swings have featured the stock market. They are due to the most fundamental of all the factors entering into speculation.

The tremendous increase in production capacity, not only of automobiles but of steel works, cotton mills, woolen mills, practically every line of industrial enterprise, has resulted in the ability of producers to meet, within a very few months, all but an abnormal demand. There is the tendency in all lines of industry to speed up production as demand increases, and inability to curtail as rapidly as demand declines results in a temporary surplus when the buying power wanes.

Where manufacturing capacity is fully occupied for only a few months at a time, the surplus of products of only a few weeks of operation tends to delay the arrival of the next period of demand. This has been true especially of steel, and as business men have come to look upon steel as the basic indicator of industry, the phenomenon has left a curiously unstable feeling.

There is no inclination to plan boldly for the future, with the result that feverish activity for a few months is replaced by skeleton operations. One contributing factor has been the improvement in the transportation service by the railroads which has resulted in quickened deliveries and hence has done away with the necessity



Indication of Future Business; Current Status

HARRY HAVILAND SIBLEY is an authority on business and economic subjects and is author of the "Business of Speculation." For many years he was head of the Philadelphia Public Ledger Syndicate Bureau in New York and is now associate editor of the National Financial News.

Mr. Sibley formerly was financial editor of the Detroit Free Press and has a wide acquaintance among business leaders. Within the past few years he has served as stock market advisor to New York Stock Exchange firms and is known to investors throughout the country as an investment expert.

Mr. Sibley's comments and reviews of automotive financial and stock market trends will appear as an exclusive feature in the news columns of future issues of AUTOMOTIVE INDUSTRIES.

for carrying the large stocks of merchandise formerly needed.

Unquestionably it is true that the speculative imagination has been fired by rumors of mergers. The financial district has watched with awakening consciousness of its real meaning the development of a major corporation in each of the important industries. The United States Steel Corporation, American Sugar Refining Co., General Electric Co., American Locomotive Co., General Motors Corporation, Radio Corporation of America, each is the largest individual in its field. Each dominates, to a considerable degree, the policies of its industry.

With the creation of such dominant factors, there has come into each of these fields the consolidation of smaller corporations. Wall Street believes that something of the kind will occur in the motor industry. It has before it the Government sanction of such consolidations in the transportation field. It feels that economics as well as the spirit of the times makes such action likely in the motor industry. Hence it lends a willing ear to rumors of such consolidations in the field of automotive transportation.

WITH the possibilities of these mergers, less is heard of the "saturation point" in the motor industry. The hard, merciless laws of competition take care of the supply and demand problem and the stock market expects that with consolidation will come the scrapping of some plants, enlargement of others, rearrangement according to geographical necessities and the restoration of production capacity in a proper proportion to demand. In other words, stabilization of the industry.

Unquestionably the stock market would, if it could, give an accurate long view forecast for the future. If the shrewdest minds in the industry combined with those of the banking world could say definitely that there was a great era of prosperity or depression ahead, it would register its opinion unfalteringly in the stock market. But because the whole world is unstable, economically, it cannot register such an opinion.

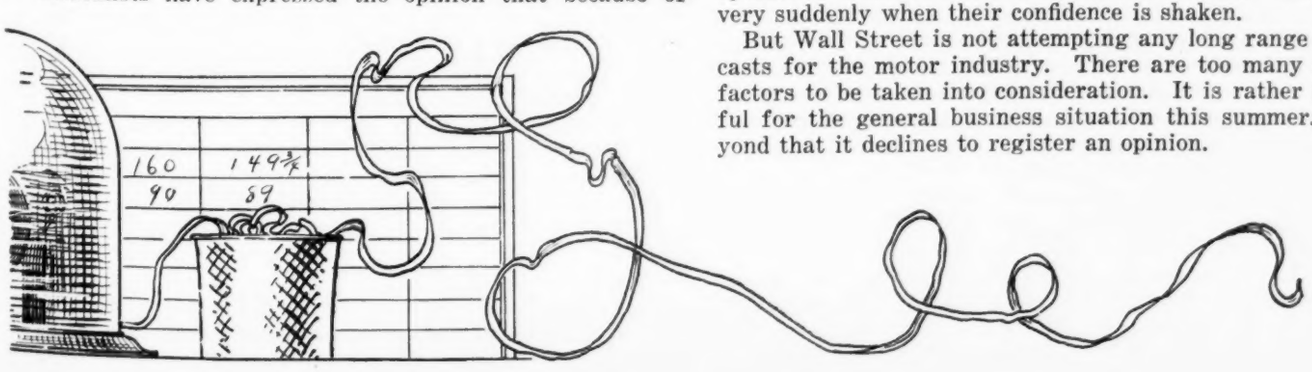
There are few persons who believe that the unstable conditions of the past five years can continue—that business can continue upon so infirm a foundation of prices.

World production capacity of raw materials as well as finished goods is far in excess of world demand, yet prices for both remain at an abnormally high level. Some economists have expressed the opinion that because of increasing gold production a price level of 150 per cent of pre-war prices will be seen for the next decade. Other equally sound thinkers believe that a drastic decline in commodities prices impends. The average person knows only that he is not making profits in proportion to the prices he pays. He feels that there is maladjustment somewhere, without being able to put his finger on the spot and say "this is it."

This lack of confidence in prices, whether of prices of raw materials or finished goods, has become almost second nature; it has begotten a similar feeling of instability among workers and so has become a potent psychological factor. Confidence in the job; in the ability to get orders for goods; in the ability to obtain raw materials and labor at a price which will permit a reasonable profit upon the goods sold; these are the fundamentals of business prosperity. They apply to all business and all industry.

WALL STREET knows, quite as well as persons in other lines of endeavor, that this is the situation that prevails. It is perfectly willing to follow the lead of market operators in the motor stocks so long as those operators themselves show confidence. They will quit very suddenly when their confidence is shaken.

But Wall Street is not attempting any long range forecasts for the motor industry. There are too many other factors to be taken into consideration. It is rather hopeful for the general business situation this summer. Beyond that it declines to register an opinion.



Is Further Readjustment of Car Prices Likely Before August 1st?

Reductions in some lines have resulted in talk of more cuts soon. Competitive conditions will govern actions.

THE possibility of price cuts within the next three months seems to be back in the minds of executives in many parts of the industry. Nobody is out looking for a chance to make reductions and a good many feel strongly that stabilized prices at this time are for the best interests of the industry. At the same time, most executives are getting set so as to be able to make any adjustments necessary to meet competition.

It would not be surprising if more passenger car prices were reduced between now and August 1.

Production definitely has passed the spring peak. Despite extreme optimism early in May, the production for that month dropped below that of April by some 17,000 and a further drop in June is only to be expected in the natural course of events.

Since a good many makers are keyed up for high production, however, it is possible that some will make an effort to offset the regular seasonal decline in sales by cutting prices.

It is not likely that any individual maker can gain materially in profits by price cutting in the next few months because his competitors are almost certain to meet his reduction. But some manufacturers will figure that way just the same.

Keeping Eye on Competitors

Every manufacturer is watching his competitors very closely. Price action in the next few months is going to be based almost entirely on competitive moves and only incidently on the basic economics of the business situation. If this statement holds true, of course, there won't be any trouble unless somebody starts something—and it's possible that nobody will.

There isn't any more economic justification for price cuts now than there was at the time of the New York Show last year. The cuts that were made at that time were practically all of a competitive nature and it is possible that a real price war might have developed had not General Motors Corp. stood by its previously announced statement that prices would not be cut at that time. The fact that General Motors prices held firm, undoubtedly had a strong stabilizing effect on the whole situation.

Governed by Economic Laws

After all, business is governed by economic laws and actions which run counter to those laws don't result in permanent gains, whatever immediate advantages may accrue. Back in November 1924, when the talk of price cuts was beginning to be raised, we wrote in AUTOMOTIVE INDUSTRIES several paragraphs which will bear repeating because they hold true today as well as at that time:

"It is important that a distinction be made between price decreases demanded by economic conditions and those resulting from an attempt to gain a temporary sales advantage. The decreases following the war were of the first type and were in line with desirable and necessary readjustment within the industry. The latter type usually generates more confusion than advantage.

"Suppose prices were cut just because of keen competition, even though buying and manufacturing conditions didn't warrant a decrease. One company cuts to gain a temporary advantage. Another follows. Then another and another.

"In the end the number of cars sold by individual companies is about the same as if no reduction had been made. But prices are stabilized on a new low level.

"Profits suffer and production isn't increased."

Difficult to Make Predictions

It is difficult to predict just what will happen, however, because the sales situation today is somewhat spotty, not only geographically, but as regards various companies. A number of companies have thousands of orders ahead today and fully expect to do as well in June as they did in May. A few actually expect to increase their output and retail sales this month. Where these expectations are realized it isn't likely that price reductions will be considered.

But every manufacturer isn't in that fortunate position. The seasonal influence is beginning to be felt in many quarters and competition is becoming greater accordingly.

The expression "Well, if anybody starts anything they will find that we can play the same game" is on the lips of executives of a good many companies. They are ready for anything. Any individual will have to get up early to catch the other napping.

Squeezing the Little Fellow

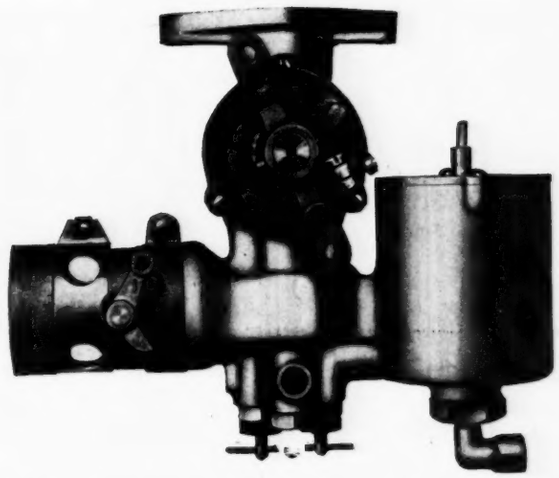
Large manufacturers by public statements and by business policies are doing their utmost to make the going hard for the little fellow. As one executive put it the other day, "It doesn't sound nice to say it in just this way, but there isn't any question that we're in a fight to the finish from now on."

One of the chief difficulties with price cuts at present would be the strong possibility of profit reductions as a result. A close economic student of automotive trends who is employed by one of the most successful companies in the business said only the other day, "I wish I could understand how Wall Street figures. When somebody cuts a price the stock goes up. I figure it should go down. One company I know lost a cool million by making a price cut a few years ago. Under present conditions, the only way a price cut can increase profits is through increased quantity. The industry as a whole isn't going to get any great quantity increase this year. Consequently, if everybody cuts, relative positions will be unchanged and profits would seem likely to suffer."

Price cuts shouldn't come as an overwhelming surprise to anybody in the next few months, although no basic economic reason for them exists.

Juhasz Carbureter of a New Type Has Four Spray Nozzles

One used for idling and all four under full load. Body and barrel type throttle cast of aluminum alloy.



Juhasz carbureter with body cast of aluminum alloy

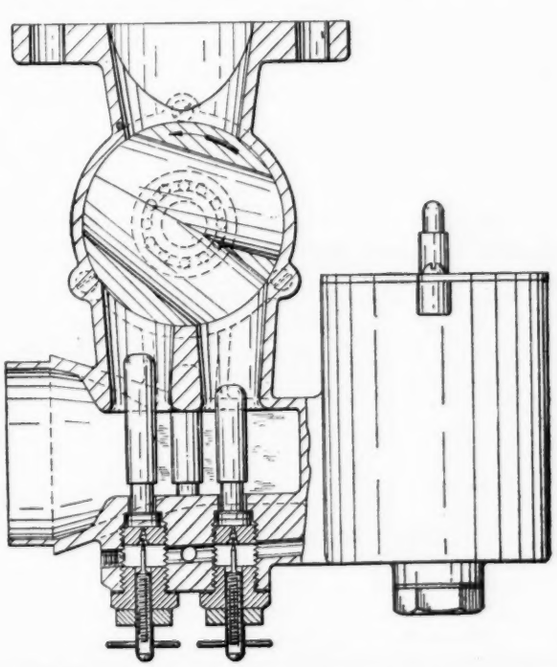
THREE of the cars which competed in the recent Indianapolis race were fitted with the Juhasz carbureter, manufactured by the Juhasz Carbureter Corp., 244 West Forty-ninth Street, New York. This differs from conventional carbureters in a good many respects. The carbureter body is cast of magnalite (an aluminum alloy), the throttle is of the barrel type and mounted on ball bearings, and there are four throats and four spray nozzles, of which only one throat and one nozzle are in action when the engine is idling.

The float chamber, which is cast integral with the carbureter body, contains the usual spun metal float and has the gasoline connection at the bottom. The float valve, of German silver, is extended through the cover of the float chamber, thereby making it possible to flood the carbureter for starting.

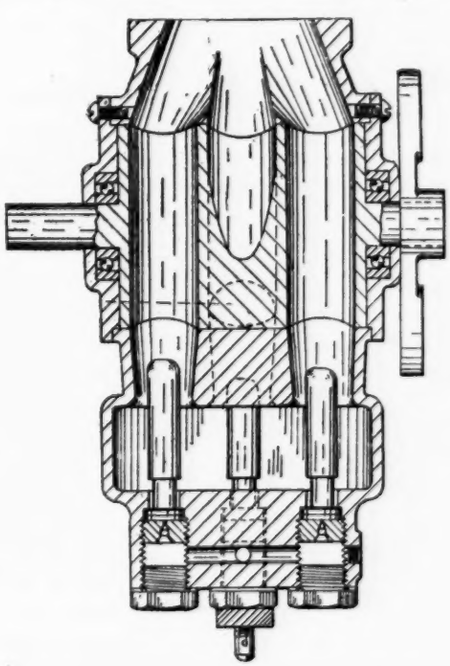
Air enters the mixing chamber at the side and passes up one or more of the four throats which deliver into the throttle chamber. The throttle is a cylinder of magnalite which is supported on ball bearings and has a clearance of 0.002 in. in the throttle chamber at normal temperature. There are four passages through the throttle barrel, the axes of two of the passages intersecting the axis of the throttle, while the other two passages, which are in between the two referred to, make an angle with each other and end in a single passage on the top side of the throttle.

In each of the four throats there is located a spray nozzle. The nozzles are of the air bled type and they are of different height. The idling nozzle is the shortest, two fixed nozzles are of intermediary length, and the high speed nozzle is the longest. The metering orifices of the idling and high speed nozzles are adjustable by means of needle valves at the bottom of the carbureter, while the other two nozzles have fixed metering orifices.

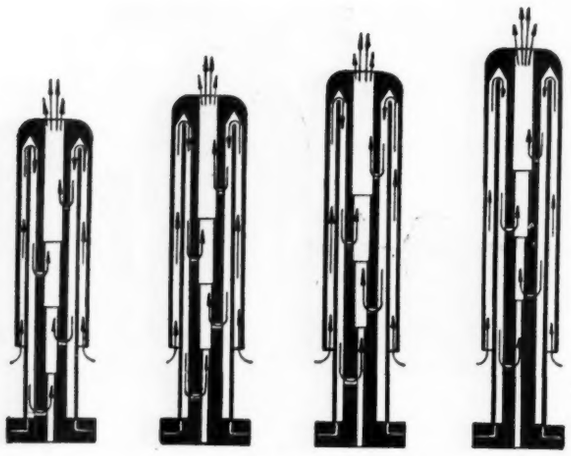
Each nozzle is surrounded by a standpipe which forms a fuel well or an accelerating well and fills with gasoline to the level in the float chamber when the engine is at rest. Through the wall of each nozzle there are four air bleeder holes. The distance between adjacent holes in the same nozzle is ¼ in., and as the bleeder holes in the different nozzles are staggered as to height, the difference in level between bleeder holes coming into action one after the other is only 1/16 in. The accelerator well is sur-



Sectional view of carbureter, showing throttle in idling position



Cross section through nozzle chamber



Sections of the four nozzles

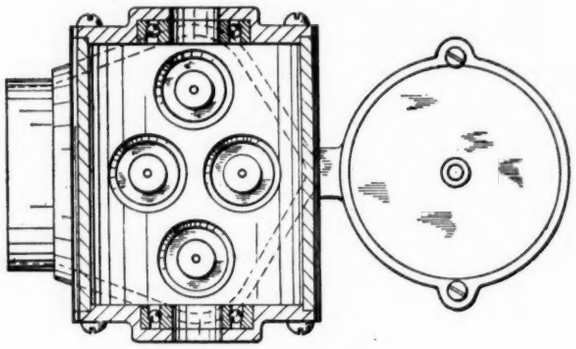
rounded by a skirt through which the bleeder air enters.

As indicated by the arrows in the drawings, the air enters the skirt at the botom, passes over the top edge of the accelerator well and through whatever bleeder holes are uncovered by fuel, to the inside of the nozzle. The level of fuel in the nozzles will vary with the demand on the carbureter. As the demand increases the level sinks, more bleeder holes are uncovered, and where ordinarily the mixture tends to become over-rich with increasing demand, the effect of the increase in the number of effective bleeder holes is to maintain the mixture substantially constant.

When the throttle is in the idling position only one of the throats communicates with the outlet of the carbureter through the throttle valve, as shown in the illustration. This is the throat containing the idling nozzle, the fuel delivery of which can be adjusted by means of the needle valve at the bottom of the carbureter. As the throttle is open farther the throats containing the two fixed nozzles are uncovered, and finally the throat containing the high speed nozzle comes into action. This nozzle is also adjustable by means of a needle valve at the bottom of the carbureter, so that the right mixture can be obtained under full load conditions.

One feature of construction which tends to keep down the richness of the mixture with increasing demand on the carbureter is that the central hole through each nozzle is stepped, the diameter decreasing toward the bottom. Thus the surface of gasoline exposed to the action of the air decreases as the demand on the carbureter increases and the fuel level in the nozzles sinks in consequence.

From the above description it will be seen that the Juhasz carbureter is of what has been aptly described as the expanding type, that is, the effective sections of both the air and the fuel passages increase with increase in the demand. This principle makes it possible to secure excellent throttling characteristics and at the same time high maximum output, because the air speed need not be excessively low at idling speeds (with consequent lack of spraying effect) nor excessively high (tending to cause wire drawing of the charge and consequent low volumetric efficient) under full load at high speed. The simple and easy method of adjustment is another feature of this carbureter.



Vertical section through axis of throttle

Duesenberg Supercharger Revolves at 30,000 R. P. M.

THE geared supercharger used on the Duesenberg car that won the Indianapolis race was designed in the research laboratories of the General Electric Co. by its engineers. It is similar in principle to the Moss supercharger developed by that company for high altitude airplanes, and is attached to the side of the engine between the carbureter and the intake manifold.

It is of centrifugal type, instead of being a positive displacement blower. Among the advantages claimed for this type are less weight and noise, a higher pressure, greater efficiency, and the production of a better gasoline mixture.

Tests on the race track and on the test block have shown that the new supercharger produces a pressure of ten pounds above atmosphere in the intake manifold, as against about one pound below atmosphere which occurs in an intake manifold without supercharging, making a total pressure rise of about 11 pounds per square inch.

Supercharging at sea level differs from supercharging at high altitude in that the former gives a pressure in the intake manifold greater than that normally required, and therefore an appreciable increase in power. The latter gives a pressure in the manifold at high altitude just equal to that which would occur at sea level.

Supercharging has three advantages for racing cars. The first is that a much greater weight of charge is forced into a cylinder of given displacement than would otherwise occur. The second is that the increased pressure in the cylinder at the beginning of the suction stroke and end of the exhaust stroke scavenges the burnt gas out of the clearance space during the short period at that time when both inlet and exhaust valves are open. The third is that the passage of the gasoline at high speed through the vanes of the supercharger thoroughly atomizes it and makes a better mixture than can be gotten otherwise.

In all automobiles there is great difficulty in getting the cylinders supplied with a uniform mixture. In order to insure this on racing cars it has been customary to use eight carbureters, one for each cylinder. With the supercharger, only one carbureter is necessary.

The enormous speed of the supercharger wheel can be realized when it is known that it revolves at 30,000 r.p.m. and is 7½ in. in diameter. This gives a rim velocity of 11 1/6 miles a minute.

EDITORIAL

Paint and Used Cars

A GOOD many dealers are beginning to realize the real value of paint in moving used cars. Adaption of nitro-cellulose finishes for refinishing work has progressed by leaps and bounds in the last twelve months with the result that refinishing a used car can be completed in about one-fourth the time previously needed.

Still, the idea of brightening up used cars with attractive color combinations is not so widespread as it might properly be. Car manufacturers can help promote the idea through their dealer house organs and literature. The factory might even work up suggested color combinations as a guide to dealers.

Sound mechanical reconditioning is essential, of course, to stabilized used car selling; but when a good paint job is added the sale is easier to make and a profit-making price is easier to get.

Sound mechanical reconditioning is essential, of course, to stabilized used car selling; but when a good paint job is added the sale is easier to make and a profit-making price is easier to get.

Buses and Railroads

THE discouraging financial showing of some of the western railroads is laid partly to bus competition by S. S. Fontaine, financial writer of the New York *World*. In a recent article he points out that the primary reasons for current embarrassment have been an inadequate rate structure, business and crop conditions. "But," he continues, "that is not the whole answer nor is a complete answer found in the rejoinder that the Panama Canal has cut off a very great tonnage from transcontinental carriers.

"Perhaps a better answer is that the railroads themselves have not kept pace with the evolution of competitive transportation in the development of their own enterprises and efficiency. They have witnessed with too much complacency the growth of the motor transportation industry, instead of taking hold of it and making it a subservient servant."

Probably the time has passed in many sections when the railroads could have taken over bus transport service and used it to serve directly as auxiliary to their own systems. In many other places, however, the bus has not yet become so well established in the hands of independent operators as to prevent railroads from controlling the situation provided they use buses to render the sort of transportation the public wants.

We still find some railroad men saying in an offhand manner, as one did the other day, "Of course, these motor buses have very little to pay in taxes and maintenance of the ways cuts no figure with them." Anybody willing to take the trouble to study the trend and the current facts about motor vehicle taxation can find without much trouble that the motor bus does pay quite a little in the way of taxes and that the trend for several years has been to make it pay more.

Materials Not Down

THERE has been little change in automotive raw materials prices since the first of this year. AUTOMOTIVE INDUSTRIES' raw material index stands at 142 for May, 1925, which is just one point higher than in May, 1924. Since the beginning of this year there has been a fluctuatian of less than five points in the index.

This indicates that there is no downward swing in automotive material prices at this time, despite the fact that there has been a steady though relatively small decline in prices of all raw materials since last January as shown by Bradstreet's raw material index. It should be noted in this connection, however, that the general index still stands about 10 points above the automotive curve.

The facts are interesting in view of the price reductions which have been made recently and the others which are rumored for the future. Certainly price drops cannot be based on a declining price trend in the materials market. Greater production efficiency may have something to do with them, but attempts to gain temporary competitive advantages will be by far the dominating factor in any cuts made during the next few months.

Babson and Automobiles

BABSON still is looking for signs of a "shake-down" in the automobile industry. He has predicted dire things for automotive manufacturers a good many times in the past and more than once has been wrong in his guess. People have continued to buy cars and the factories have continued to produce them at a highly satisfactory rate.

In a talk before the National Association of Purchasing Agents recently, H. H. McGill of Babson's organization, said that the general business trend for the immediate future will be gently downward, but warned the purchasing agents that "the automobile industry should be watched carefully for signs of a shake-down."

While it is true that automotive production will fall off in the next few months there isn't any basic reason to believe that automobile manufacturers will not have reasonably good business for the rest of 1925. That profits for the year will be better than 1924 seems almost certain, since several companies are reported to have earned as much per share in the first half of this year as they did in all of 1924.

Our Industry Today

Expect Declines This Month in Sales and Production —Some States Predict Better Business in June—Truck Outlook Better

NEW YORK, June 10—Slight declines in both sales and production are expected this month in the automobile business. The seasonal movement is now under way, but dealers in nearly every section of the country look for less of a decline than was experienced at this time last year.

In some States, in fact, there is an expectation that June business will be better than May. Predictions to this effect come from Ohio, Illinois, Pennsylvania, South Dakota and Washington. The truck outlook is better than it was a year ago in many communities, and about the same in the others.

Drouth in the Southwest continues to affect automotive business in that section, but rains in the Midwest have improved prospects there.

The used car situation is irregularly better, the Middle West and Northwest sections particularly reporting improvement in this important part of automobile merchandising.

The decline of 4 per cent in May production as compared with April is regarded as an encouraging sign, since it took place despite a practically uninterrupted flow of orders from the field. In some quarters the lower output is pointed to as evidence that the manufacturers started to curtail before the seasonal slackening set in, determined not to repeat the errors of overproduction of former years. Yet due consideration must be taken of the fact that there were fewer working days in May than in April, and that several factories were kept from full production by inability to obtain all the bodies needed for closed cars.

Accessories at High Level

A tendency toward lower prices is noted, and this, together with the introduction of new and attractive models, is stimulating business for several of the companies. Another means of combating sales resistance has been taken by the manufacturers as a whole. Through the National Automobile Chamber of Commerce they are making plans for a co-operative insurance company, to quote lower rates on cars sold to new buyers on the partial payment system.

Tire and accessory business is being maintained at a high level, and the year seems likely to set a record in production and use of these products.

WILLYS AIDS SHIPPING POLICY

WASHINGTON, June 9—John N. Willys, president of the Willys-Overland Co., is a member of a committee which met here recently to lay the groundwork for the consideration of a national shipping policy by the National Merchant Marine Conference, which is being organized under the auspices of the Chamber of Commerce of the United States.

Irregular Drift in Stocks Is Seasonal

Motors Firm to Strong and Accessories Heavy This Week

NEW YORK, June 10—The irregular drift of stock prices toward lower levels this week has been the natural sequence to the spring advance. The desire to transfer paper profits into cash pending a more definite outlook for trade and industry is usual at this season, the more so in that price levels are high and the future by no means clear.

There is ample credit for commercial transactions at prevailing rates, but supply of funds for speculative purposes appears to be restricted somewhat by withdrawals from banks in this city and Chicago by smaller out-of-town institutions. This has resulted in a somewhat firmer tone to the money market and may reflect, in part, preparations for income tax payments June 15 and mid-year settlements of July 1.

Psychological Factors

Any discussion of the stock market must consider two psychological factors of fundamental importance. The first was the shock to public confidence caused by the drastic decline of stock prices during March, with resultant monetary losses. The second is the hope for income tax reduction. The first has resulted in the practical withdrawal of the speculative "outside public"; the second, in the refusal of wealthy holders of stocks to sell, even at recent high levels.

An understanding of this situation will explain the daily reiteration of "professional operations" in the financial news. With offerings of stocks comparatively restricted and no active public speculation, speculative groups have been able to take their favorites upon "personally conducted" movements in nowise reflecting any change in fundamental conditions.

That stocks of companies identified with the automotive industry, motor car, tire and rubber, accessories, body building and oil, should have been the most active recently, is quite according to seasonal precedent. The movement of greatest general interest was that of Maxwell Motors, both the advance in the stock and the later decline in the certificates, illustrating the importance of the "technical position" in price movements.

Maxwell "Natural Corner"

In this case the first "natural corner" ever reported on the New York Stock Exchange occurred. Through the exchange of stock for the new certificates the supply of the former was so reduced that sellers for the decline were unable to borrow stock for delivery. As many of these sellers had "hedged" their position by buying the certificates, the removal of the stock from trading resulted in substantial offerings of the latter to save such profits as had accrued. A perpendicular decline of 20 points resulted. Manifestly such movements have no relation whatsoever to the fundamentals of supply, demand, profits and dividends.

As groups, the motors and allied issues have been firm to strong throughout the week, but there has been curious irregularity. Thus General Motors sold at 79

(*Continued on page* 1044)

Advertising Managers to Meet in South Bend

SOUTH BEND, IND., June 10—Various phases of advertising and its application to distribution of automobiles and automotive products will be discussed by advertising managers of the National Automobile Chamber of Commerce and the Motor and Accessory Manufacturers Association, who are to meet here tomorrow for a two day joint session.

Edward S. Jordan, chairman of the advertising committee of the chamber, will preside at the Thursday morning session when newspaper rates will be the principal topic. In the afternoon Harry Tipper of the Chilton-Class Journal Co. will talk on "Uses of Direct Mail in Car and Truck Advertising."

Ezra W. Clark, chairman of the advertising council of the Motor and Manufacturers Association, will preside at the first day session of his organization, which will be mainly concerned with the distribution of accessories and the supporting of jobber sales. In the afternoon Neal G. Adair, manager of the educational department of the association, is to lead a discussion on a proposed survey of advertising costs.

Joint sessions of the N. A. C. C. and M. & A. M. A. will be held Friday morning and afternoon, at which time subjects pertinent to all advertising men in the automotive field will be discussed.

Vigorous Action on Rubber Is Expected

Akron Meeting Studies Plans—Consider Netherlands as Source of Supply

AKRON, June 10—Directors of the Rubber Association of America, representing the leading rubber companies, are to hold a special meeting here Thursday to discuss the crude rubber situation, now of vital importance to the rubber and automotive industries. The meeting is called by W. O. Rutherford, president of the association and vice-president of the B. F. Goodrich Co.

Vigorous action may be taken to relieve the burden imposed upon the American consumer by high crude rubber prices, maintained largely by British restrictions.

Protests Are in Vain

A member of the association committee, which has been negotiating with Eric Miller, chairman of the British Rubber Growers Association, said efforts to have the restrictions modified, releasing more rubber for export, had been in vain, and cablegrams appealing for relief had been ignored.

Retaliatory measures may now be resorted to, this manufacturer said. These might include a boycott of British rubber and an agreement with the Dutch to furnish more rubber to America. Proposals of a tax on British rubber, with no taxing of the Dutch product, have been heard. Further economic pressure might be brought to bear by threatening to curtail rubber production in this country.

Due to the British restrictions and larger tire production, crude rubber rose from 17 cents last year to 78 cents a pound a few days ago. Despite two tire advances manufacturers are finding it increasingly difficult to operate under present conditions.

Dutch May Give Relief

Partial relief for American consumers may soon develop as a result of increased production on plantations owned by the Dutch in the East Indies and elsewhere. This information was obtained in connection with a visit to Akron this week by Dr. A. C. D. Jonkherr, Minister to the United States from the Netherlands.

While Dr. Jonkherr said he could not speak for publication, rubber manufacturers obtained the impression that the Netherlands government is inclined to maintain friendly relations with manufacturers in this country, and to aid them in obtaining crude supplies at prices which will give growers a fair profit, but not be burdensome to consumers.

Dutch possessions produce nearly 50 per cent of the world's crude rubber requirements, and this output is not subject to restrictions. The British government is reported to be attempting to pave the way for the Dutch to enter the "rubber combine," so that prices will be kept at high levels. In that event it is predicted that rubber probably would soon sell above $1 a pound. Whether the Netherlands government adopts a restrictive policy, similar to the British, depends largely on the attitude of American manufacturers, it is understood.

Dr. de Graeff was the guest of Harvey S. Firestone, president of the Firestone Tire & Rubber Co. Executives of other rubber companies were invited to meet him at a dinner at Mr, Firestone's home.

GENERAL MOTORS NET PROMISES NEW RECORD

NEW YORK, June 10—General Motors Corp. net profits for the second quarter of 1925 are expected to be nearly three times the net of $7,666,034 earned in the second quarter last year. With earnings in the first quarter this year equalling $3.08 per share on the 5,160,599 shares of common, earnings for the first half year may approach the $7.37 per share reported for the entire year of 1924.

April earnings are understood to have been the highest in the corporation's history. Cash holdings are $140,000,000, compared with $88,059,916 at the end of last year, and equalling between $25 and $30 per share on the common.

Second Apperson Price Cut Since January 1

KOKOMO, IND., June 11—The Apperson Automobile Co. announces price reductions, the second since Jan. 1, bringing the price of Apperson cars to the lowest point in the 33 years of the company's history.

The new list, effective June 15, embodies reductions from January prices of from $200 to $500, and affects all models of both six and eight-cylinder chassis.

Stimulated sales, resulting from the public demand for the Straight-Away Eight and Super-Value Six, are mainly responsible for the new prices, according to Apperson officials. Factory production schedules have been stepped up several times since the first of the year.

Following is the new price list, compared with that of Jan. 1:

Sixes	Jan. Prices	New Prices
Phaeton not in production		$1,575
Sport phaeton	$1,850	1,650
Brougham	2,350	2,050
Coupe	2,350	2,050
Sedan	2,395	2,100
Eights		
Phaeton	2,550	1,995
Brougham	2,800	2,450
Coupe	2,800	2,450
Sedan	2,850	2,595

Haynes a Leader in Sales Meeting Plan

Heads Factorymen's Committee Cooperating in Series of Sales Congresses

NEW YORK, June 10—Representatives of the National Automobile Dealers Association and the National Automobile Chamber of Commerce will meet soon to work out a program for 123 sales congresses on subjects of vital interest to the industry.

On the committee representing the manufacturers are: Frederick J. Haynes, Dodge Bros., Inc., chairman, H. H. Rice, General Motors Corp., Charles D. Hastings, Hupp Motor Car Corp., L. G. Peed, Willys-Overland, Inc., O. H. McComack, Hudson Motor Car Co., and H. C. Vance, Studebaker Corp. of America.

Formal approval of this project for a series of sales meetings in the interests of dealer education, in conjunction with the N. A. D. A., was given by the N. A. C. C. board of directors at their June meeting.

Similar proposals in the past have not worked out, but the manufacturers generally are now convinced that the industry will be benefited by the plan and are determined to make it as effective as possible. The first meetings probably will not be held before October.

Although the subject matter for the meetings has not yet been worked out or the speakers appointed, the manufacturers feel that the assistance most needed by dealers is in respect to financial conduct of their business. Cost accounting, budgeting, and proper used car practice should be stressed, the factory men hold.

New Auburn Roadster Models Are Announced

AUBURN, IND., June 11—Six-passenger roadster models on both its six and eight cylinder chassis have just been introduced by the Auburn Automobile Co. Three passengers are carried in the front seat and three in a seat in the rear deck, which is reached by a convenient door. List prices are $1,495 for the six and $1,975 for the eight.

Finish is pyroxylin lacquer, which is polished to a high lustre and attractively striped, and the upholstery is handbuffed brown Spanish leather.

Engine heat indicator, gasoline gage, ammeter, oil gage and speedometer are all mounted in one panel under the glass on the instrument board. The emergency brake is operated by a pull type control which is located under the instrument board. Lighting switches are mounted on the steering wheel and the ignition switch is also located there on the eight cylinder model. Rear vision mirror and automatic windshield cleaner are included in the regular equipment.

Maxwell Transfer Complete June 24

Stock Majority Has Already Given Its Assent to Chrysler Deal

NEW YORK, June 10—The final step in the transfer of the assets and good-will of the Maxwell Motors Corp. to the newly organized Chrysler Corp., which will continue to operate the properties as heretofore, will be taken on June 24, when Maxwell stockholders in special meeting will act upon the transfer plans as submitted by the Maxwell directors.

No opposition is expected, since more than 90 per cent of Maxwell stock has been deposited with the Central Union Trust Co. as assenting to the proposed change, and the committee appointed to carry out the plan, of which George W. Davison, president of the Trust company, is chairman, has already declared the plan operative.

Incorporation papers for the new Chrysler Corp. were filed in Delaware, June 6. This corporation takes the place of the Chrysler Corp., formed in Michigan with nominal capital to conform with legal matters necessary in connection with carrying out the transfer plan.

The new corporation will have an authorized capitalization, consisting of 275,000 shares of $8 cumulative prefered stock and 800,000 of common, all no par value.

Under the transfer plan 239,373 shares of Chrysler Corp. preferred will be issued to Maxwell stockholders on this basis:

For each 100 shares of Maxwell Class A stock, 100 shares of preferred and 10 shares of common Chrysler stock.

For each 100 shares of Maxwell Class B stock, 100 shares of Chrysler common.

Trans-Atlantic Flight Prize Time Extended

NEW YORK, June 11—The Raymond Orteig prize of $25,000 offered to the aviator who first crosses the Atlantic in an airplane in non-stop flight between Paris and New York, has been extended for a further period of five years from June 1. This announcement was made on behalf of Raymond Orteig of this city, who made the original offer in 1919, by his counsel, Colonel George W. Burleigh of Delafield, Thorne and Burleigh.

These trustees are named to administer the prize: Major General James G. Harbord, U. S. A., retired, president, Radio Corp. of America; Maxime Mongendre, French Consul-General, New York; Colonel Franklin Q. Brown, president, Army and Navy Club of America; Colonel George W. Burleigh, Judge Advocate General's Department, U. S. A., Reserve; Colonel Walter Scott, vice-president, Butler Bros.; M. Lucien Jouvaud. president, French Benevolent Society, and Raymond Orteig, Jr.

Aviators of any Allied nationality are eligible to try for the prize, but the competitor must hold an aviator's certificate issued by the National Aeronautic Association, and be duly entered on the association's competitors' register.

Fisher Body Reports $6.08 Net Profit Per Share

NEW YORK, June 11—Earnings of $18,394,205 for the fiscal year ended April 30, after all expenses and reserves for depreciation, as compared with net earnings of $26,607,163 in the previous fiscal year, are reported by the Fisher Body Corp. and its subsidiaries, with net income of $15,244,409 against $22,-102,008 last year.

Net income for the fiscal year just ended was equivalent to $6.08 a share earned on the 2,400,000 shares of $25 par value common of the parent company. Net income in the previous year equalled $35.73 a share on the 600,000 of common then outstanding, or the equivalent of $8.93 a share on the common now outstanding. Last year's report did not include Fisher Body Ohio Co.

After payment of $9,000,000 in cash dividends and certain other payments, the company reports a surplus of $5,589,-682 against a surplus of $15,393,811 last year. The profit and loss surplus is reported at $13,693,026, against $31,157,-876, the reduction being chiefly due to the change in the company's capital structure through the issuance of four shares of new $25 par value stock in exchange for each share previously held.

Cash holdings on April 30 were $5,-623,150, against $10,301,473 last year; Government securities, etc., valued at $2,318,255 against $3,380,959, and accounts and notes receivable, $17,270,170 against $10,723,787 last year. Among current liabilities are wages, accounts payable, etc., amounting to $9,204,651 against $8,672,440.

TIRE PLANT MAY BE SOLD

AKRON, OHIO, June 10—Plants and other assets of the Studebaker-Wulff Rubber Co. at Marion, Carey and Wadsworth, Ohio, may be sold soon to satisfy creditors' claims. The company, which went into bankruptcy last month, formerly manufactured about 2500 automobile tires a day. Walter G. Kirkbride of Toledo is receiver.

TO MANUFACTURE NEW RIM

MADISON, WIS., June 10—M. D. DeWitt and Joseph M. Dierienzo have organized a corporation with $50,000 capital to manufacture a new type of automobile rim with an automatic lock, which they invented.

Exports of Million Cars a Year Seen

Owen Says This Point Will Be Attained in the Not Distant Future

NEW YORK, June 10—Prediction that the sale abroad of a million American built cars a year will take place in the not distant future was made by Percy Owen, chief of the Automotive Division of the Department of Commerce, at a dinner of the Overseas Boosters' Club here this week. He pointed out that last year's record of 244,234 cars exported and 142,000 vehicles assembled abroad was far in excess of the fondest expectations a few years back.

All Records Broken

"Our records of export have in the past few months been breaking all records," he said. "In March we shipped 35,566, in April 34,727. At this rate we will be approaching the million a year years in advance of our fondest hope.

"For ten years we have had our own way in foreign markets, but I can see in the not distant future the necessity of meeting competition such as we have not yet seen. I believe American manufacturers will answer this problem, but to do so we must be ready with a program built up after careful investigation and with a complete knowledge of all conditions and circumstances."

Mr. Owen criticized American automotive exporters for lack of preparation for invading foreign markets and urged that more attention be given to the extension of credit. He cited the fact that the great export business of the world and especially Germany and Great Britain, was largely built up through a system of extending long credits.

Field for Accessories

"I believe if your accessories were properly exhibited in foreign countries," he said, "you would experience greater sales. So far the foreign merchant has apparently not had brought to his attention the value of complete stocks and complete and proper display. The motor car user does not have his 'appetite whetted' for extra equipment, as he has in this country, by complete display of goods and prices and by display advertising.

"If you can't see your way to lead off by yourself, why not organize a company among yourselves and do it together. The Webb-Pomerene law permits non-competing manufacturers to get together in one company for foreign trade. There are many advantages accruing to such a corporation. I believe a study of this suggestion will be of direct benefit to those interested in enlarging their foreign sales."

Continental Motors Profits Show Gain

Net Equivalent to 79 Cents Per Share Is Reported for Six Months

NEW YORK, June 10—Net profit of $1,402,864 after depreciation, interest and Federal taxes, equivalent to 79 cents a share on 1,760,845 shares of no par capital stock outstanding, is reported by the Continental Motors Corp. for the six months ending April 30. This compares with $1,163,744 or 66 cents a share for the same period last year.

Operating profit increased from $2,366,287 in the 1924 period to $2,461,131 in 1925 and dividends from $352,169 to $704,338, but surplus decreased from $811,575 to $698,526.

Patents and good will in both periods were set at $5,908,316. Investments increased from $221,339, to $868,590, notes and accounts receivable from $2,601,569 to $2,717,667 and cash on hand from $2,047,587 to $5,445,125. Value of land and buildings decreased from $15,801,846 to $15,382,387, inventories from $8,200,223 to $5,349,957, sundry debtors from $89,957 to $26,566 and deferred charges from $1,021,497 to $919,454.

Among the liabilities capital stock remained the same in both periods, $17,308,450, and mortgage bonds the same, $7,500,000. Surplus increased from $8,335,551 to $9,644,374. Purchase money obligations decreased from $35,835 to $27,500, accounts payable from $1,459,519 to $1,166,597 and reserve Federal taxes from $644,263 to $390,203. The 1925 balance sheet shows no reserve for contingencies as compared with $117,597 for the 1924 period.

Announce New Elcar Four and Six Models

ELKHART, IND., June 9—Three new models in the four-cylinder line and three new models in the six-cylinder line are announced by the Elcar Motor Co. The eight-cylinder models now in current production were announced early in the year. The new four-cylinder line is known as Model 4-55, replacing Model 4-41, and the six-cylinder line as Model 6-65, replacing Model 6-51. Several changes have been made in both models.

Following are the body types and prices:

Model 4-55—five-passenger touring, $1,095; five-passenger coach, $1,195; five-passenger sedan, $1,395.

Model 6-65 — five-passenger touring, $1,295; five-passenger coach, $1,395; five-passenger sedan, $1,595.

Both models are powered with Lycoming engines. That in the four-cylinder has 3⅜ in. bore and 5 in. stroke, cylinders cast in block, L-head and 5-bearing crankshaft. The six-cylinder engine has 3⅛ in. bore and 4½ in. stroke, L head, Swan manifold, and crankshaft with four main bearings.

Other specifications of the four-cylinder model include: Zenith carbureter, thermo-syphon cooling, force-feed lubrication and gear-type oil pump, Auto-Lite starting, lighting and ignition system, Borg and Beck single dry plate clutch, Warner transmission, wood wheels and 5.25 in. balloon tires, external contracting brakes on rear wheels and emergency brake on front universal. Front wheel brakes may be had for $40 extra. Semi-elliptic springs are used front and rear, those in front being 2 in. wide by 34 in. long, and those in the rear 2¼ in. wide by 51 in. long. The drive is Hotchkiss.

Raymore Manager of Whitehouse Cooker Co.

FOND DU LAC, WIS., June 10—The defunct Henry A. Poppert & Son Co. of this city, manufacturer of brass and aluminum castings, die castings, patterns, etc., is being reorganized as the Whitehouse Cooker Co., with capital stock of $75,000. The manufacture of steam pressure cookers will be made the principal activity, although custom work in ordinary and die casting and the production of intricate patterns, dies, etc., will be continued. E. E. Raymore has been appointed general manager. He will continue his Chandler and Cleveland franchise and the sales and service business under submanagement, giving his entire attention to the Whitehouse industry.

British Concerns Make Substantial Reductions

WASHINGTON, June 10—Substantial price reductions have been made by some British car makers, according to cable advices received by the Automotive Division of the Department of Commerce. Daimler, B. S. A., Vauxhall, Ariel and Coresley have cut prices on different models, and while no statement has been made by Morris and Rover, it is expected that they will soon take similar action.

Word also comes from London that the danger of reimposition of the McKenna duties prior to July 1 has practically disappeared and American importers are accepting duties and making adjustments for new prices.

WILLS HAS LONDON AGENCY

MARYSVILLE, MICH., June 8—C. H. Wills, president of Wills Sainte Claire, Inc. announces that all negotiations for the representation of the Wills Sainte Claire in England have been completed. C. H. Bill of London, regarded as one of the foremost automotive authorities in Europe, has taken over the Wills Sainte Claire franchise and the first shipment of Wills Sainte Claire cars is on the way to London.

New High Records in Output of Gasoline

Domestic Demand Mounts, but Daily Export Average Shows Decrease

WASHINGTON, June 10—The nation's gasoline output, which has recently broken record after record, continued its upward trend in April, with a production of 860,492,115 gal., a daily average of 28,700,000, according to the Department of the Interior, in commenting on statistics compiled by the Bureau of Mines. These are record figures for both total and daily average production. The daily average represents an increase of 4 per cent over that of March, and 14 per cent over that of April, 1924.

Domestic demand was 810,849,075 gallons, a daily average of 27,030,000, an increase over March of 7,010,000, or 35 per cent, and an increase over April, 1924, of 34 per cent. Exports in April amounted to 109,750,000 gal., a drop of 9 per cent in daily average for March.

Stocks on hand at refineries on May 1 were 1,561,002,024 gal., a decrease of 50,000,000. The seasonal decrease in stocks, due to the advent of the motoring season, this year manifested itself earlier than usual. This is the first time since 1920 that stocks have shown a decrease before May, and that stocks of any month have been lower than those of the same month of the previous years. Gasoline stocks as of May 1 represented 58 days' supply at the April rate of domestic demand. This compared with 80 days' supply on hand a year ago and 80 days' supply on April 1.

Belflex Wins Decision on Tension Shackle Rights

NEW YORK, June 10 — Following four years of litigation between the International Motor Co., and Harvey W. Bell, the Belflex inventor, to establish priority rights on the patent on fabric tension shackles, the Court of Appeals at Washington, has handed down a decision in favor of the Belflex Corp., New York. This decision affirms that of the Commissioner of Patents.

In the decision, written by Associate Justice Robb, the invention is described as "a suspension link of flexible, inelastic, non-metallic material used in connecting the springs of automobiles to the chassis frame."

SELDEN SHIPMENTS GROW

ROCHESTER, June 10—The Selden Truck Corp. announces that shipments up to June 1 were 70 per cent greater than for the same period in 1924. May shipments were 34 per cent larger than in 1924.

Reclaimed Rubber Demand Increases

Scarcity of Raw Materials and High Prices Are Causes of Substitution

AKRON, O., June 10—Old automobile tires, cast off rubber boots and shoes and other worn-out rubberized articles are becoming valuable for reclaiming purposes, as a result of the shortage of crude rubber and the extended rise in that market.

Demand for reclaimed rubber, of which a large amount is produced and used in the Akron district, has increased greatly during the past few months. With rubber factories enlarging operations and raw material supply dwindling, chemists in the industry are said to be substituting reclaimed rubber wherever possible without cheapening the finished product.

This is in line with the recent statement by Secretary Hoover, in which he urged the chemical reclamation of rubber on a larger scale, to relieve the burden thrown upon the American consumer by the 100 per cent rise in prices of imported crude rubber.

Will Increase Capacity

Improvements now under way at the plant of the Philadelphia Rubber Works Co. here will increase capacity by approximately 1,000,000 pounds a month, according to John S. Lowman, vice-president and general manager. A two-story factory and an office building are being erected, and new machinery is being installed in the main plant.

This company is the largest independent rubber reclaiming company operating in Akron. Goodyear and Firestone have reclaiming units in connection with their plants, but the output is largely taken by their own factories. A group of Akron men, including officials of several rubber companies, recently organized a company to reclaim rubber, but operations have not been started.

Members of the Rubber Association of America have been told by Secretary Hoover that "The high price of crude rubber makes profitable the reclamation of much larger amounts of used rubber for re-use, and previous experience indicates our domestic consumption can be supplied up to 40 per cent from this source, instead of about 20 per cent, which maintains when rubber is selling below 35 cents a pound."

HUPP HAS 3000 ORDERS ON HAND

DETROIT, June 11—The Hupp Motor Car Corp. has 3000 unfilled orders, 1800 of which have come in since June 1. The company carried over from May 1200 unfilled orders. In the first week of June Hupp shipped about 1000 cars. May retail sales were around 3000, while production was 2636.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, June 10—Business was variously affected by the high temperatures of last week, with the stimulation of trade in seasonal goods probably outweighing the retardation of industry here and there.

The condition of the cotton crop on May 25 was 76.6 per cent of normal as compared with 65.6 per cent a year earlier and a ten-year average of 72 per cent for that date.

The average daily output of pig iron in May, 94,542 gross tons, was 13 per cent under that for April, but 10 per cent above the rate a year earlier. Steel ingot output, averaging 133,010 tons daily, was only 3.5 per cent less than in April, and 3.6 per cent more than in May, 1924. The decline in the preceding month was about 15 per cent.

Bituminous coal production averaged 1,508,000 tons daily last week in May, comparing with the year's low of 1,253,000 in mid-April.

Petroleum production averaged 2,346,900 barrels a day in the week ended May 30, continuing a series of new high records for the industry. Gasoline consumption in April set a new record, averaging 27,030,000 gallons daily, and on May 1, for the first time since 1920, stocks of gasoline at refineries were less than those reported a year earlier.

Net operating income of Class I railroads in April was $66,199,236, or $3,900,709 more than in April, 1924, notwithstanding a decline of $1,735,600 in gross revenues. Earnings in the first four months of this year were at the annual rate of 4.38 per cent on property investment, as compared with 4.45 per cent in the corresponding period last year.

Loalings of revenue freight in the week ended May 30 totaled 920,514 cars, the decline of 65,695 cars being accounted for by observance of a holiday.

Average commodity prices receded somewhat last week, as shown by Professor Fisher's index of wholesale prices, which stood at 157.2 as compared with 158.0 the week before.

Bank debits to individual accounts in 254 leading centers in the week ended June 3 totaled $11,631,000,000, a gain of 5.2 per cent over the figure for the week before and 28.1 per cent over that for the corresponding week last year.

Discounts by Federal Reserve banks declined slightly, $1,600,000, in the week ended June 3. Holdings of acceptances purchased in open market increased $6,500,000, and Governmet securities $4,900,000. The net increase in total earning assets, accordingly, was $9,800,000. A further increase of $4,100,000 in Federal Reserve note circulation was reported, and a gain of $20,300,000 in deposits. Reserves declined $24 300,000, and the ratio of reserves to combined deposit and Federal Reserve note liabilities was reduced from 77.0 to 75.9 per cent.

Loans of reporting member banks secured by Government obligations or other securities increased $30,000,000 in the week ended May 27, against a decline of $19,000,000 in other loans, chiefly commercial. Investment holdings changed only slightly, declining $1,000,000.

Truck as Railroad Necessity Described

Survey Shows Motor Vehicle Will Become Part of Every System

NEW YORK, June 11—Thirty-three railroads in the United States and Canada are now using motor trucks as part of their service, according to a survey just completed by the banking firm of Dominick & Dominick, which says:

"On shorter hauls the motor truck will take the lead and must become more and more an integral part of every railroad system. Thirty-three railroads in the United States and Canada are now using trucks as part of their service, and it would seem that this is only a start.

"There are three special fields in every railroad system which the truck can cover. The first is the substitution of motor trucks for local freight trains known as 'pick up and drop' trains because they stop at every small station to handle small allotments of freight. The Pennsylvania is operating thirty-eight trucks serving 1007 railroad miles and 438 stations.

Passenger Service Grows

"The second is freight transference from terminal to terminal in large cities, eliminating the slow expensive process of freight car shunting from yard to yard.

"Thirdly, the use of motor trucks for door to door pick up and delivery of less than carload freight is an additional service which a railroad can render to its patrons.

"But in passenger service as well, the motor vehicle is playing each year a more important part. There are 60,000 motor buses in this country. Twenty-three representative cities act as centers for 1506 automobile lines. In California there are 550 bus companies with three large stage terminals costing more than a million dollars; Ohio has 500 bus lines, Indiana 206, and this is only the beginning of the development in motor transportation."

SUPPLIES SCRIPPS-BOOTH PARTS

DETROIT, June 9—The Oakland Motor Car Co. has taken over the repair parts stock of the former Scripps-Booth division of the General Motors Corp. and is prepared to supply parts for this car through the Oakland dealer organization.

It is estimated that there are 22,000 Scripps-Booth cars still in service.

W. F. PFANDER DIES

YONKERS, N. Y., June 9—Walter F. Pfander, chief engineer of the Durant Motors, Inc., died here at his home following a brief attack of pneumonia. He had been connected with the Durant company since its organization.

Men of the Industry and What They Are Doing

Lee Named Sales Manager

With the opening of an Indianapolis office of the Chevrolet Motor Co., Charles R. Lee has been promoted from field representative to sales manager for this zone, comprising almost the entire State, with 120 dealers. Mr. Lee has been with the General Motors organization for about five years, most of the time in the Chevrolet division. Floyd Snyder has been appointed assistant to the manager, E. J. Thornton is office manager and C. C. McCann is in charge of the car order division.

Given Is Promoted

James Cressen Given, recently appointed assistant general sales manager for the Dunlop Tire and Rubber Co., started as a salesman with the Continental Cauhouc Co., and was later associated with the United States Tire Co., the Miller Co. of New York and the General Tire Co. of Philadelphia. He became Philadelphia division sales manager for the Dunlop company in 1924 and E. H. Kidder, vice-president, appointed him assistant general sales manager June 1 this year.

Ring Goes to Research Group

Charles N. Ring, until recently works manager of the Allied Steel Castings Co., Harvey, Ill., has been appointed assistant director of the Electric Steel Founders' Research Group, succeeding W. J. Corbett, who resigned to become secretary-manager of the Steel Founders' Society of America. Mr. Ring has also been connected with the American Steel Foundries, the Commonwealth Steel Co., the Illinois Steel Co., the Laclede Steel Co., and the Ohio Steel Foundry.

Lawson Enters Bus Field

Arnold Lawson, eldest son of the late Thomas W. Lawson, financier, has entered the ranks of motor coach operators, having purchased two Pierce-Arrow coaches which ply between Boston and Newport, R. I. These coaches are operated under the name of the Dreamwold Motorcoach Co., and are finished in the colors of the renowned Lawson track and stable colors, dark blue and gold, with the Dreamwold crest on the door.

Lubeck Leaves Apperson

E. M. Lubeck has resigned as general sales manager of the Apperson Automobile Co. Don C. McCord, president, has not announced his successor.

Mr. Lubeck was commissioned a captain when the country entered the war, rising to the position of lieutenant colonel in charge of all motor transportation on the active front, serving in a similar capacity with the Army of Occupation in Germany. He joined the Apperson concern in 1922.

Matthews Goes to Detroit

The U. S. Light & Heat Corp. has transferred H. A. Matthews, vice-president of the Railway Sales Division to the post of resident vice-president at Detroit. The growth of the company's business in the automobile battery division caused this charge, which does not conflict with the company's present Detroit organization, of which W. W. Pennington is sales manager.

Hamilton Joins Commerce

A. C. Hamilton has been appointed consulting engineer of the Commerce Motor Truck Co., according to a recent announcement from W. R. Bassick, president. Mr. Hamilton was formerly chief engineer of a General Motors automotive unit, and for the past four years has made an intensive study of the bus field and its requirements.

Whittaker Joins Hoffman

C. K. Whittaker, formerly sales manager of the Paul G. Hoffman Co., Inc., Studebaker distributor in Los Angeles, has resigned to join the executive sales department of the Studebaker Co. at South Bend. He was called to the factory by Paul G. Hoffman, who was recently made vice-president in charge of sales.

Seeks Canadian Factory Site

J. W. Pickavant of Birmingham, England, who is touring Canada on behalf of British motor and accessories industries and the Country Chemical Co., recently visited Hamilton, Ont., to look over the city as a possible factory location.

Sloan on Acceptance Board

At a meeting of the board of directors of the General Motors Acceptance Corp., held June 2, the resignation of Irenee duPont was accepted, and Alfred P. Sloan, Jr., of New York, was elected a director to fill the vacancy on the board.

Chandler Goes to Memphis

O. B. Chandler has been appointed sales manager of the Western Electric Co., Inc., supply distributing branch house at Memphis, Tenn., succeeding E. P. McGrath, who has been transferred to the New York branch.

Crabtree Succeeds Witt

W. O. Crabtree has been appointed general sales manager of the Flint Motor Co., succeeding F. E. Witt, resigned. Mr. Crabtree had been identified with the sales activities of the Durant organization.

Shaw Becomes Sales Manager

The Duplex Motor Truck Co., Lansing, Mich., announces the appointment of A. J. Shaw as general sales manager, succeeding H. M. Lee, resigned. Mr. Shaw was formerly connected with the Flint Motor Co.

Gehrke Manages Utica Branch

Arthur W. Gehrke, formerly of the Rochester, N. Y., branch of the Fisk Tire Co., has become manager of the Utica branch. D. H. Owen of the Utica office succeeds Mr. Gehrke in the Rochester branch.

Sanderson Goes to Syracuse

G. E. Sanderson has been appointed manager of the Syracuse branch office of the Wagner Electric Corp.

New Packard Earnings Record for Year Seen

DETROIT, June 11—New records for volume output and earnings during the fiscal year ending Aug. 31 are indicated for the Packard Motor Car Co. Volume of incoming business, it is stated, is keeping well ahead of production, with every effort being made to expand operations. Net income for the first half year, after all charges, amounted to nearly $3,000,000, or over $1 a share on the 2,377,020 shares of $10 par value common.

Earnings of only a little more than $4,000,000 are needed in the second half year to make a twelve months' total larger than $7,081,879, or $2.39 a share earned in the 1923 fiscal year, largest in the company's history.

The $4,000,000 point is expected to be reached because Packard has been operating at substantially higher levels ever since the end of February.

Rickenbacker Visiting Dealers

Capt. E. V. Rickenbacker, vice-president and director of sales of the Rickenbacker Motor Co., has begun his usual summer visits to all important dealers in the Middle West. Sales Manager Hodgkins is touring Eastern territory.

INDIAN OUTPUT INCREASES

SPRINGFIELD, MASS., June 9—Indian Motorcycle Co. is showing the largest output in years. May shipments exceeded those of April, which set a new high production record for the period since the wartime boom. Up to June 1 approximately 14,000 Indian motorcycles had been produced this year, and the schedule calls for 1750 in June.

Heat Causes Delay in Steel Shipments

But Many Hand-to-Mouth Buyers Maintain Operation at Nearly Normal Rate

NEW YORK, June 10—Automotive consumers who have fallen into the habit of "playing too close to the cushion" in ordering steel requirements are experiencing a certain amount of inconvenience because of delayed shipments from mills. The recent heat wave impaired the output of the steel industry as a whole, and in some sheet mills the deficit was especially noticeable.

There was undoubtedly considerably less steel worked up last week, just as there was less produced, but some automotive buyers have made it a practice recently to send specifications for steel not more than ten days ahead of the time their operating schedules call for it, and it happened that many of these hand-to-mouth buyers were able to maintain a relatively normal operating rate despite the heat.

Attitude Not Unjustified

Steel producers ascribe this practice of buying tomorrow's steel today to the general tendency of the times, but there has developed a condition which fully justifies the automotive purchasing agent in his attitude toward steel sellers. This condition has been noted especially in the sheet market.

A purchasing agent would place an order for a carload of sheets one day, only to learn on the next that, had he waited until then, he could have bought $1 or $2 a ton lower. Full-finished automobile sheets have been an exception.

The sheet market, as a whole, however, has been so ragged lately that many purchasing agents have lost confidence in it, whittling individual orders to the lowest notch. If after they had placed an order for one carload, they learned of a mill that would cut the price $1 or $2, they would place an order with the latter, thus lowering the average cost, which they could not have done had they obligated themselves for larger tonnages.

Compared with the sheet market, that for strip steel is firm, the cold-rolled ruling steady at 3.75c., Pittsburgh, and hot-rolled at 2.20c. to 2.40c., according to width. Cold-finished steel bars are firmer at 2.60c., Pittsburgh.

Pig Iron—With $18, Valley, done for No. 2 foundry in a representative sale, the market has yielded further, but liquidation at a greater sacrifice than this figure involves seems to be out of the question. Malleable commands $18.50, Valley. Automotive foundries are buying in a routine way.

Aluminum — Fairly sizable lots of aluminum ingots are coming in from England, Norway and Switzerland, but nearly all of this metal is earmarked against previously placed contracts. Imports of sheets are ridiculously light, but the fact that some sheets do come in shows that even though there is little advantage in the matter of price in such importations some consumers are compelled to have recourse to the foreign material because unable to obtain domestic supplies. The market remains pegged at the prices heretofore in vogue.

Copper — Copper and brass rolling mills in the Waterbury district are operating at between three-fifths and three-quarters of capacity, and a very impressive part of the orders in hand is of automotive character. The market for the red metal is just about holding its own.

Tin—Consumers appear to be buying only what they need at the higher prices which London has lately succeeded in chalking up.

Lead—The supply of lead seems to be somewhat less tight, but is by no means abundant. The market is fairly easy.

Pittsburgh Plate Glass Expands Its Facilities

MILWAUKEE, June 8 — Business conditions in the plate glass, paint and varnish industries are so satisfactory, and the outlook so substantial that plans for extension of production are being laid by the Pittsburgh Plate Glass Co., which held its annual conference of executives here recently.

Milwaukee is the seat of the Patton paint and Pitcairn varnish divisions as well as large distributing warehouses, and about $5,000,000 is being spent in enlarging the paint and varnish factories over a five-year period ending in 1926. Capt. Charles W. Brown, of Pittsburgh, president, said the demand for plate glass from the automotive industries is the greatest ever experienced, due to the popularity of closed body types, especially the coach. The company is building an important addition to its plate glass plant at Creighton, Pa., and enlarging its linseed oil works at Red Wing, Minn., and its paint brush factory at Baltimore. The expansion is supervised by Ludington Patton of Milwaukee, vice-president.

TAKES BLACKHAWK NAME

MILWAUKEE, June 10—The American Grinder Manufacturing Co., one of the principal manufacturers of wrenches for the automotive industries and trade, has changed its corporate title to Blackhawk Manufacturing Co. The product has borne the trade mark "Blackhawk." The original production of tool grinders and similar mechanical specialties is continued.

PLAN TO MANUFACTURE PARTS

JOHNSON CITY, ILL., June 10—Lewis White, B. Peterson and Arthur Williams have incorporated to manufacture automobile accessories and parts here.

Intercity Air Tour Rules Being Drawn

S. A. E. Aeronautical Committee Cooperates in Plans for Flight

DETROIT, June 10—Rules governing the intercity airplane reliability tour to be conducted in September have been drawn up by the contest committee of the National Aeronautic Association, and Coker F. Clarkson, general manager of the Society of Automotive Engineers has enlisted the aeronautical advisory committee of the Society in the consideration of the rules as drafted.

As discussed at conferences between officers of the Detroit Aviation Society and the Society, the tour will start at Ford Airport, Dearborn, Mich., on Labor Day, Sept. 7, and continue for one week, with a one-day stop in each of half a dozen cities where there are good landing fields, such as Fort Wayne, Chicago, St. Louis, Indianapolis, Dayton, Columbus and Cleveland, finishing at the starting point.

Zimmerman is Chairman

Members of the S. A. E. advisory committee considering the draft of rules are:

Paul G. Zimmerman, Keyport, N. J., chairman; Henry M. Crane, General Motors Corp.; F. C. Ericson, Ericson Aircraft, Ltd., Toronto; R. Depew, Fairchild Aerial Camera Co., New York City; W. L. Gilmore, Curtiss Aeroplane & Motor Co., Buffalo; T. H. Huff, Huff Deland Aero Corp., Ogdensburg, N. Y.; G. J. Mead, Wright Aeronautical Corp., Paterson, N. J.; A. T. Loening, Aero Co., New York City; R. W. Schroeder, Aircraft Development Corp.; W. B. Stout, Stout Metal Airplane Co.; R. H. Upson, Aircraft Development Corp.; L. M. Woolson, Packard Motor Car Co.; C. M. Vought, Chance Vought Corp., Long Island City, N. Y.; E. P. Warner, Massachusetts Institute of Technology, Cambridge, Mass.; L. C. Milburn, Glenn L. Martin Co., Cleveland; A. V. Verville, Buhl-Verville Co., Detroit, and E. A. Johnson, Johnson Airplane Supply Co., Dayton, Ohio.

Dates Are Fixed for London Exhibitions

WASHINGTON, June 10—The Society of Motor Manufacturers and Traders, Ltd., in the United Kingdom has advised the Automotive Division of the Department of Commerce that during 1925 these international exhibitions will be held at Olympia Hall, London:

Oct. 8-17, motor exhibition for private motor cars, carriage work, components, accessories, tires and equipment; Oct. 29-Nov. 7, Commercial Motor Transport Exhibition for gasoline, steam and electrical components, accessories, tires and equipment; Nov. 23-Dec. 5, Yacht, Boat and Marine Motor Exhibition for pulling, sailing and power craft, gasoline and oil engines, components, accessories and equipment.

FORD DAILY OUTPUT AT NEW HIGH RECORD

DETROIT, June 10—Production of Ford cars and trucks throughout the world is now averaging approximately 8125 daily, the highest in the history of the organization. Since May 1 the Ford assembly plants in the United States have been averaging daily more than 7200. In this same period Ford Motor Co. of Canada, Ltd., and the plants in Europe and South America have added a daily average of 925.

On May 19 production in the domestic plants reached a new high mark of 7858 cars and trucks, and the Canadian company and foreign plants produced 892, setting a record of 8750 for the day.

Larger Sales Abroad Seen by Buick Head

FLINT, June 10—Exports of Buick cars for April were 2,251, compared with 1,800 in 1915, according to H. H. Bassett, president of Buick Motor Co. From Aug. 1 to April 30 export shipments approximated 20,000.

Mr. Bassett sees the way open for increased business in practically all countries. Disturbed conditions in China have affected the market there but this situation has improved to the extent that increased shipments have been made in the last few months. He does not expect the increased tax on cars going into England to have a serious affect on car sales in the medium price field.

There is an increasing demand for closed cars in all countries, Mr. Bassett said, though open cars, particularly sport models, continue to hold the greatest popularity.

ROGER NEWTON GOODE DIES

PARIS, June 1 (*by mail*)—Roger Newton Goode, manager of the French branch of the Wayne Tank & Pump Co. of Fort Wayne, Ind., died here recently at the age of forty-four, after a brief illness. Mr. Goode represented the Packard Motor Car Co. for a number of years prior to and during part of the war. After the armistice he was European travel representative of the Packard Co., and about a year ago he formed a French company to handle the Wayne products.

VULCAN PLANS NEW TRUCK

LONDON, June 10—The Vulcan Motor & Engineering Company, one of the largest English manufacturers of 1-1/4 to 2-1/2-ton trucks, plans to produce a 4-ton truck, equipped with a 4-cylinder Dorman engine, rated at 36 h.p.

Truck Makers Discuss Models and Standardization of Parts

Association Appoints Committees to Make Survey and Submit Recommendations—Hudson and Horning Offer Cooperation

NEW YORK, June 9—Standardization was the theme of the Motor Truck Industries, Inc., at a meeting held last Friday, June 5, at the Plainfield (N. J.) Country Club. The members of the organization were the guests of the Spicer Manufacturing Corp., and the meeting was preceded by a tour of inspection of the Spicer plant at South Plainfield.

It is the intention of the organization, according to plans outlined by the president, J. W. Stephenson, of the Indiana Truck Corp., to concentrate during the coming year on the standardization of parts and models.

The first step in this direction was the appointment by Mr. Stephenson of two special committees, one to be known as the Committee on Models and the other as the Committee on Axles. The former will be composer of A. S. More, Selden Truck Corp.; J. R. Spraker, Atterbury Motor Car Co.; O. W. Hayes, Republic Motor Truck Co.; T. R. Lippert, Stewart Motor Corp., and S. A. Cook of the Diamond T Motor Car Co. It will be the duty of this committee to make a survey of the truck industry and submit a report in thirty days with recommendations as to what models are required to meet the general needs of operators and what models may safely be discontinued as unprofitable to the industry and the public.

Will Report Sept. 16

As soon as the recommendations of this committee are available the Committee on Axles will begin to function by studying the axle requirements of the different models in an effort to decide on a standardized line of axles that will meet as far as possible the growing demand for interchangeability. The axle committee, which was instructed to have its report ready for the next meeting of the organization on Sept. 16 at the plant of the Clark Equipment Co., Buchanan, Mich., is composed of C. J. Helm, Acme Motor Truck Co.; O. W. Hayes, Republic Motor Truck Co.; E. B. Ross, Clark Equipment Co., and Col. Fred Glover, Timken-Detroit Axle Co. President Stephenson and B. A. Gramm, Gramm-Bernstein Motor Truck Co., who is secretary and treasurer of the organization, will serve as ex-officio members of both committees.

This movement of the Motor Truck Industries, Inc., which has for its members the manufacturers of assembled commercial vehicles and parts makers, will be patterned after the standardization efforts of a number of other industries and has for its principal object the elimination of waste in production and distribution, the reduction of inventories and a degree of interchangeability of parts which will reduce the service and maintenance costs of the owners of their products.

Axles are the first component parts to be taken up, but after they have been standardized other parts will be studied—transmissions, engines, universal joints, shafts, springs, wheels, steel sheets, etc.

In keeping with the purpose of the meeting, there was an address on standardization by Ray M. Hudson, chief of the Division of Simplified Practice, Department of Commerce. Mr. Hudson pointed out the immense savings effected in many other industries by the standardization of products and offered the truck men the services of his division in their efforts along that line.

The waste noted in all industry at the present time, said Mr. Hudson, is almost as great as the value of the goods produced. He praised the automotive industry as one of the best managed in the country, but said that a survey by his division had revealed the fact that there were still 123 opportunities for simplification of products and methods in this field. The profits of industry tomorrow, he declared, must come from the wastes of today. He thinks the three biggest factors in present business management are the use of budgets, waste elimination in production and distribution, and simplified practice.

Profits Made Smaller

He said Government statistics reveal that the average net profits in eight major fields of commerce and industry in this country for 1922 were but 5-12/100ths per cent on a business which totaled $101,000,000,000. The last two years, he continued, have shown an increasing keenness in competition, which would naturally tend to make the margins of net profit even smaller.

"We have found it almost axiomatic," he said, "that regardless of the line, whether it be paving brick or bed blankets, 80 per cent of the business comes from 20 per cent of the varieties offered. It is in that 80 per cent which yields only 20 per cent of the business that you find the greatest opportunities for simplification."

The Society of Automotive Engineers was represented at the meeting by its president, A. L. Horning. He reviewed briefly the standardization work of the S.A.E. and said that, as nearly as he

(*Continued on page* 1045)

Monthly Records for Nash Sales in May

New High Mark Reached for Fifth Time Since September, Says E. H. McCarty

NEW YORK, June 10—The Nash Motors Co. reports that May Nash sales and production were the greatest ever attained in a single month since the founding of the company, surpassing the figure set by May, 1924, by 187 per cent. Speaking of this achievement, E. H. McCarty, Nash general sales manager, said:

"The new high mark is of interest in another way, as it was the fifth month since Oct. 1, 1924, to break all previous records for a month's business.

"Also May was the ninth consecutive month to surpass the highest total on our books for any previous similar month in the history of Nash Motors. An analysis of the monthly increases during the nine-month period ending May 31 reveals fact that average monthly gain to date over the same nine-month period a year previous is 68 per cent.

"A compilation of the monthly business done by the entire industry throughout this stretch of nine months shows that average monthly sale of all cars has been substantially below average monthly sale of the corresponding months a year ago.

"Latest reports from Nash distributors and dealers throughout the country provide sound evidence that the national Nash demand may be expected to strike even higher during the months to come. There is every good reason to believe that the second six months of 1925 will exceed even the high Nash sales record of the first half year."

Stocks Seasonal

(*Continued from page* 1036)

and Jordan Motors at 58 in February. The former has not since reached that price and the latter has declined 16 points, while the Maxwell issues, Nash Motors, Chandler, Packard, Pierce-Arrow, Willys-Overland and Studebaker have established new high levels. Various reports and rumors have accompanied these movements.

That General Motors is supposed to be earning $12 a share and Jordan Motors $8 is of little moment, apparently. Of greater importance is the suggestion put forward apparently by the railroads, that sales of motor trucks should be restricted in certain sections by law. The financial community paid small attention to the report, but it apparently has some basis for probability in view of inroads on rail revenue made by motor trucks.

The accessories companies' stocks generally have been heavy. Both Stewart-Warner and American Bosch Magneto have been under pressure of liquidation due, in part, to the decline in radio equipment sales, into which field both companies recently have embarked. The stocks of the body building corporations, Briggs Manufacturing, Fisher, Murray and Mullins have backed and filled without definite trend.

Curtailment of production and increased demand for gasoline resulted in strength and activity in this group. It was noticeable that the better class of these stocks, like Texas Company, were favored over and above the purely speculative issues.

Persistent pressure against the better class of stocks, both rail and industrial, gave the market an irregular appearance as the week ended.—H. H. S.

Automotive Leaders in New Guardian Trust Co.

DETROIT, June 11—Among the directors and stockholders in the Guardian Trust Co., Detroit's newest banking house, are a dozen men prominent in the automotive industry. The company will open for business in the heart of Detroit's financial district in about a month.

William Robert Wilson, former president of the Maxwell Motor Corp. and vice-president of the Irving National Bank of New York, a director of the new company, is here completing plans for the opening of business. He says that plans already mapped out or under way should insure the company's growth to a position among the strongest trust company organizations in the country, and that connections with other organizations are already complete or approaching completion.

Car Men on Board

Among the directors are: Roy D. Chapin, chairman of the board of directors of the Hudson Motor Car Co.; Fred J. Fisher, president, Fisher Body Corp.; Edsel B. Ford, president, and Ernest Kanzler, vice-president, Ford Motor Co.; Alvan Macauley, president, Packard Motor Car Co.; Louis Mendelssohn, treasurer, Fisher Body Corp.; Walter S. Russell, president, Russell Wheel and Foundry Co.; Allan Shelden, president, Murray Body Corp.

According to the unofficial view here, organization of the Trust company marks the first concerted effort by the automobile industry to establish its own banking facilities. That the business will be primarily concerned with automobile financing operations seems agreed upon, but just what lines the enterprise may engage in at first is still a secret.

Nearly all automobile companies have occasion to establish bank loans, float stocks and bonds and refund or cancel securities issues, and the advantages of a banking institution primarily interested in such operations are regarded as patent.

It is rumored that the enterprise will enter the insurance field as part of the movement now under way to bring down coverage costs on fire and theft, but this cannot be confirmed, and it is discounted in authoritative quarters. The enterprise may be involved in the financing of time sales, but only indirectly as a sideline.

FINANCIAL NOTES

R. M. Hollingshead Co., manufacturer of Whiz products and chemicals for automotive and household purposes, has filed articles increasing its capital stock to $20,000,000. One of the big capital items is the new plant under construction adjoining the company's original building, the new structure to cost upward of $600,000.

Fisk Rubber Co. reports May sales were in excess of $6,750,000, while the average for the six months, from November to April, was less than $2,500,000. Preliminary profits for May, after all charges including interest and taxes, were in excess of $750,000, or $3.98 a share on the 189,515 shares of first preferred stock.

Packard Motor Car Co. declares an extra cash dividend of 5 per cent and the regular quarterly dividend of 3 per cent on the common stock, payable July 31 to holders of record July 15. Alvan Macauley, president, said that no further or other dividend action would be taken during the fiscal year.

Dunlop Rubber Co., Ltd., England, has called a stockholders' meeting to consider authorization of 3,750,000 ordinary shares and of increase of borrowing powers beyond £7,500,000, as may be required to reduce obligations regarding debenture stock outstanding.

Jordan Motor Car Co. has voted the regular quarterly dividend of 75 cents per share on the common stock, and 1¾ per cent on the preferred, payable June 30 to stockholders as of record June 15.

Paige and Chevrolet Production Is High

DETROIT, June 9—Three new production records were set in May by the Paige-Detroit Motor Car Co., caused, factory officials say, by buyers throughout the country clamoring for immediate delivery.

The last working day of the month registered the largest single day production record; 403 Paige and Jewett cars were produced that day. Previously 335 cars had been shipped on May 14, exceeding by five the largest previous daily output of 330 made March 7, 1924.

May production totaled 5841, or 169 better than the previous monthly record set in March, last year. While a substantial share of this production is made up of the new Jewett coaches, all Paige and Jewett models are reported to be meeting with a heavy buyer demand.

Chevrolet Has Big Month

Chevrolet production totaling 52,853 motor cars and trucks made May the second highest production month in the history of the company, displacing April by 617. Of the total 42,783 were for domestic sale and 10,070 for Canada and export.

May retail sales were 48,176, the fourth largest delivery month. April was the largest month, exceeding May by 5107.

Unfilled orders on Chevrolet books at the end of April were 36,512, compared with 30,709 at the end of May.

17,500,000 Cars and Trucks in U. S. Now

International Chamber Will Hear What Cars Have Done for America

WASHINGTON, June 10—Americans now spend $8,000,000,000 annually in the purchase and maintenance of automobiles, with latest figures showing 17,500,000 passenger cars and trucks in use in the United States, one to every seven inhabitants, according to a report of the American Committee on Highway Transport just made public here. This report will be submitted to the third biennial conference of the International Chamber of Commerce, opening at Brussels, June 21.

"Greatest Productive Force"

The automobile is credited in the report as the greatest single new productive force in the economic and social development of the United States in the last twenty-five years. It is further described as performing "a significant function in eliminating sectional differences and the manifold uses of modern highway transportation are welding the nation into a homogeneous whole."

"The development of motor transportation which has taken place in the United States will inevitably come in other countries," says the report. "Perhaps the best service which the United States can render is to make available a knowledge of its mistakes and errors as well as of its successors and development and place before the other nations in the International Chamber the results of its experience."

After stressing the fact that the motor car is not a luxury but an economic necessity, the committee says:

"An Economic Necessity"

"During the period of the motor car's advance in America savings bank deposits have nearly doubled, individual bank deposits have more than tripled, assets of building and loan associations have tripled and life insurance in force has increased two and one-half times. This would seem to prove that development of the automobile as a basic element of transportation has been a vital part of the increased efficiency and productive capacity of all interests.

"The development of motor transportation has revolutionized the life of the farm. Estimates place the number of automobiles in the 6,500,000 farms of the United States at 4,200,000 in 1924 with 370,000 motor trucks also in use.

"Obviously it is as a unit of transportation that the motor passenger vehicle and the motor truck assume their greatest importance. One of the lessons that Americans have learned, after some bitter experience, is that the transportation problem is of a dual nature—its major or truck line functions and its minor or local distribution functions. The tying-in of individual transportation to water, steam and electric railway systems presents a major problem, since no one form of transportation can ever reach its greatest state of usefulness to the community unless all other agents are duly weighted. Out of the welter of conflicting interests and active opposition there is developing in the United States a definite understanding of the relation between motor and other transportation and we are now able to avoid many of the losses and the conflicts in which railways and motors previously competed for service for which they were economically unfitted."

Balloon Tire Patentee

Alden L. Putnam, who has been granted the basic patents covering balloon tires

NORWALK COMPANY EXPANDS

NORWALK, OHIO, June 10—The Norwalk Auto Parts Co., manufacturer of Linendoll Automobile Heaters, has taken over additional property adjoining its present plant in order to double its facilities, and is arranging the plant for progressive production. According to A. E. Linendoll, treasurer and general manager, this expansion was caused by increased demand for Linendoll Heaters.

GUSTAV BUCHHOLZ DIES

WASHINGTON, June 10—Gustav Buchholz, one of the promoters of the Baltimore-Washington Speedway scheduled to open July 4, died suddenly here this week, in his fifty-first year.

Report Goodyear to Pay Back Dividends

Sales Volume Up 20 Per Cent in First Four Months of Current Year

AKRON, O., June 10—Payment of back dividends, amounting to 29-3/4 per cent, on the 7 per cent cumulative preferred stock of the Goodyear Tire & Rubber Co., is again being discussed informally by directors of the company, according to reports in banking circles.

The first plan, to pay off the obligations to preferred stockholders in common stock, was dropped early in the year because of opposition by minority interests. A second plan, said to be under consideration, provides for payment of both common and preferred stock. It is believed this is more likely to be adopted.

Volume of sales in the first four months of 1925 is reported by Goodyear officials to be about 20 per cent in excess of last year. Earnings are expected to show a similar increase, although they may not be as large in the latter half of the year as in the first six months, on account of the higher cost of crude rubber.

Truck Makers Meet

(*Continued from page* 1043)

had been able to estimate, the average annual savings to the automotive industry as a result of this work totaled about $312,000,000. It was curious to note, he added, that this sum just about equalled the average annual earnings of the industry at the present time. Mr. Horning pledged the cooperation of the S.A.E. to facilitate and promote the standardization efforts of the truck men.

C. A. Dana, president of the Spicer Manufacturing Corp., spoke of the economies made possible by standardization, relating some of the experiences of his own organization to illustrate his points. Through standardization of models and parts, he said, the smaller truck manufacturers will be able to purchase materials in much larger quantities and thus get the benefit of prices which will permit them to operate on a more profitable basis.

BIANCHI HAS NEW MODEL

MILAN, ITALY, June 1 (*by mail*)—Bianchi-Automobiles announces Model-20, a new chassis model. Bore and stroke of the engine are slightly larger than those on the Model-18, which it replaces. There are four forward speeds, four-wheel brakes, balloon tires, and the camshaft chain drive has been replaced by helically cut gears. Several other improvements have been made both in the chassis and body designs.

Coming Events

SHOWS

Sept. 14-19 — Cleveland, Public Auditorium, Annual Convention and Exposition, American Society for Steel Treating, W. H. Eisenman, secretary.

Sept. 21-26—London, England, Annual Cycle and Motorcycle. Show under auspices of the British Cycle and Motorcycle Manufacturers and Traders Union, Ltd.

Sept. 28-Oct. 3—Chicago, Fourteenth annual Safety Congress and Exhibit, Rainbow Room, Hotel Winton, under direction of National Safety Council, A. M. Smith, business manager.

Oct. 5-9—Atlantic City, Young's Million Dollar Pier, Manufacturers' Exhibition in connection with American Electric Railway Association Convention.

Oct. 8-17—London, Olympia passenger car show.

Oct. 29-Nov. 7—London, annual truck show.

Nov. 26 - Dec. 6 — Berlin, Germany, Annual Automobile Show in the Kaiserdamm.

CONVENTIONS

June 16-19—White Sulphur Springs, Greenbrier Hotel, Summer meeting of Society of Automotive Engineers.

June 22-27—Summer Convention of the Automotive Equipment Association at the Broadmoor Hotel, Colorado Springs, Colo.

June 24-26—Seattle, National Foreign Trade Council Convention.

Sept. 14-19 — Cleveland, Public Auditorium, Annual Convention and Exposition, American Society for Steel Treating.

Oct. 5-9—Atlantic City, Young's Million Dollar Pier, American Electric Railway Association.

Oct. 7-10—Montreal, Motor and Accessory Manufacturers Association Convention.

RACES

June 13—Altoona, Pa.

June 20—Baltimore-Washington Speedway, Laurel, Md.

July 26—Paris, Montlhery Track, French Grand Prix.

Sept. 7—Altoona, Pa.

Sept. 30—Fresno, Cal.

Oct. 10—Baltimore-Washington Speedway, Laurel, Md.

Oct. 24—Charlotte, N. C.

Nov. 26—Los Angeles.

S.A.E. MEETINGS

National

June 15 - 19 — Summer meeting of the Society of Automotive Engineers at White Sulphur Springs, W. Va.

Sept. 15-16—Production meeting and exhibition.

Sept. — Automotive Transportation meeting.

Nov. — Service Engineering meeting.

Auburn in Production on New 6-66 Models

AUBURN, IND., June 10—The new Auburn model 6-66 is now in production in three body styles ranging in price from $1,495 to $1,795. The chassis has a 120 in. wheelbase and the engine is a six-cylinder Lycoming with 3-1/8 in. bore and 4-1/2 in. stroke.

Four wheel mechanically operated brakes are regular equipment. Front brakes are a fully-enclosed internal design and the rear brakes are of the contracting band type. The emergency brakes are operated by a pull lever under the instrument board. This lever actuates the external brakes at the rear wheels which are also a part of the service braking system.

All models are fitted with balloon tires on wood wheels, although Smith steel wheels may be had at extra cost. The steering gear is a Ross variable ratio type. The closed bodies are similar in design to those used on the eight-cylinder chassis, being finished in lacquer with Brewster windshields, centralized control on steering wheels, all instruments under one panel on dash, metal quarters, four wide doors and a rear seat 48 in. wide.

Prices are: brougham, $1,595; sedan, $1,795; roadster, $1,495. The roadster model seats five, three in front and two in the rear. A convenient door makes the rear seat readily accessible.

BUMPER MAKERS EXPAND

WEST ALLIS, WIS., June 9—The Badger Manufacturing Co., of Milwaukee, manufacturer of automobile bumpers, has leased 50,000 square feet in the former plant of the Avery Co., Mitchell and Fifty-seventh streets.

BUILDS BETHLEHEM PLANT

BETHLEHEM, PA., June 10—The Van Why Auto Body Works, Inc. of Stroudsburg, plans to move into a new plant which it is constructing here.

BACK IN THE DAYS OF THE DEVIL WAGON

LOS ANGELES, June 8—Only two decades ago the automobile was called the "devil wagon." Files of the Automobile Club of Southern California 20 years back show that in the trial of an autoist accused of driving 26 miles an hour in violation of the city speed limit of 12 miles an hour, jurors impaneled in Pasadena asserted that they had never ridden in automobiles and that their knowledge of the machines was confined to getting out of the way of these devil wagons. Yet they were not prejudiced and found the driver not guilty.

Those were the days when 50 machines driven by club members took two days to tour from Los Angeles to Riverside. And the trail was sprinkled with confetti flung from the lead car.

FRENCH SALES ON UPGRADE

WASHINGTON, June 10—Sales of automobiles in France have increased since May 1, according to the Automotive Division of the Department of Commerce, but not to the extent of furnishing extensive relief to manufacturers who have large stocks of finished machines on hand. It is reported that Citroen plans to introduce several new makes at an early date and would have done so before had he been able to move stocks of present models.

Exports of passenger cars from France during first quarter of 1925 amounted to 13,189 machines, compared with 11,714 during this period last year. Great Britain is now the leading market for French cars and important shipments are reported being made to that country in advance of revived duties.

Lexington Machine Corp. Buys Rochester Motors

ROCHESTER, N. Y., June 10—Assets of the Rochester Motors Corp. have been acquired by the Lexington Machine Corp., newly incorporated for $500,000 to enter the machining field, utilizing the extensive plant facilities of the purchased company.

Bicket Nairn, formerly of the Rochester Motors Corp., is president and treasurer of the new corporation. Charles F. Morley, president of the Morley Machinery Corp. and formerly vice-president and general manager of the Symington Machine Corp., is vice-president and John F. Thomas, secretary. These officers with Buell P. Mills, a director of the Central Bank, and James F. Douty of Baltimore, treasurer of the Locke Insulator Corp., make up the board of directors.

CHEVROLET SALES GROW

DETROIT, June 9—The Chevrolet Motor Co. shipped 52,853 cars and trucks during May, which displaces April as the second highest production month in the company's history. April production was 52,236 cars and trucks. Of May production, 42,783 units were for domestic sale and 10,070 for Canada and exports. April and May production closely approached October, 1923, when Chevrolet production reached its highest point. May retail sales were 48,176, the fourth largest delivery month.

RUBBER COMPANY CURTAILS

CONSHOHOCKEN, PA., June 10—The Lee Tire and Rubber Co., has curtailed operations to conserve the low priced rubber on hand until the market becomes more stable. Although about 100 employees have been laid off, John Kerns, general manager, expects full operation to be resumed by the middle of July.